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TIDAL AND LUNAR DATA FOR  
POINT MUGU, SAN NICOLAS ISLAND,  
AND THE BARKING SANDS AREA  
DURING 1990

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SELECTED  
DEC 05 1989  
D Cg D

Compiled by  
RICH DIXON  
Geophysics Division

31 December 1989



Approved For Public Release; Distribution Is Unlimited  
**PACIFIC MISSILE TEST CENTER**

Point Mugu, California 93042

# PACIFIC MISSILE TEST CENTER

AN ACTIVITY OF THE NAVAL AIR SYSTEMS COMMAND

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Executive Director

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## INTRODUCTION

This publication combines into a single source all tidal and lunar data for operational locations of the Pacific Missile Test Center for use in Calendar Year 1990.

The data presentations are in two main divisions: one for Point Mugu and San Nicolas Island, and the other for the Barking Sands area. Within each division, the times of moonrise and moonset and tidal data are given. Appendixes provide information on lunar phases, sunrise and sunset times and calculation of the tide at any time. This publication is issued annually. Information regarding this data may be obtained from the Geophysics Division of the Range Operations Department.

## DATA SOURCE AND TIME REFERENCES

The data given here have been prepared from information contained in Tide Tables for the West Coast of North and South America including the Hawaiian Islands, 1990, published by the National Ocean Service.

For Point Mugu and San Nicolas Island, all times listed are Pacific Standard Time (PST); add eight hours to obtain Universal Coordinated Time (UCT or Z). When Daylight Savings Time (PDT) is in effect, 1 hour is to be added to the times given. In 1990, Pacific Daylight Time is scheduled to commence at 0200 PST on Sunday 1 April, and to end at 0200 PDT on Sunday 28 October.

For the Barking Sands Area, all times listed are Alaska-Hawaii Standard Time (AHST); add ten hours to obtain UCT. Daylight Savings Time is not observed in Hawaii.

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## TIDAL DATA

The ranges of tidal heights that may be expected at Point Mugu and San Nicolas Island are shown in table 1. The range of heights for the primary harbor in the Barking Sands area, Port Allen, is shown in table 2. The times and height of high and low tides for 1990 at Point Mugu are given in the even-numbered tables 4 through 26, and at San Nicolas Island in the odd-numbered tables 5 through 27. Similar tide data for Port Allen are given in tables 29 through 40.

Table 1. Tidal ranges for Point Mugu and San Nicolas Island

Tidal Levels	Point Mugu	San Nicolas Is.
	Height (Ft)	Height (Ft)
Extreme high water	7.3	6.7
Mean higher high water	5.3	4.9
Mean high water	4.5	4.1
Mean tide level (mean sea level)	2.7	2.5
Mean low water	0.9	0.8
Mean lower low water	0.0	0.0
Extreme low water	-2.0	-1.8

Table 2. Tidal Ranges for Port Allen

Tidal Levels	Height (Ft)
Extreme high water	2.6
Mean higher high water	1.6
Mean high water	1.2
Mean tide level (mean sea level)	0.7
Mean low water	0.2
Mean lower low water	0.0
Extreme low water	-0.4

These tables list the times and heights of high and low tide for each month of the year and chronologically through each day. The heights are all measured from mean lower low water and are values for a sea unaffected by wind waves or swell. The height and character of the sea surface are influenced by factors other than the predictable positions of the moon and sun, and thus are likely to be higher or lower than computed values indicate.

## LUNAR DATA

Times of moonrise and moonset for the Point Mugu-San Nicolas Island area in 1990 are given in table 3, and for the Barking Sands area in table 28, preceding the tidal data for the respective stations. Information regarding the phases of the moon in 1990 is found in appendix B.

Latitude 34° 07' N  
Longitude 119° 07' W

Point Mugu NAS, California  
Moonrise and Moonset for 1990  
Pacific Standard Time

Nautical Almanac Office  
U.S. Naval Observatory  
Washington, D.C. 20392-5100

Day	Jan.			Feb.			Mar.			Apr.			May			June			July			Aug.			Sept.			Oct.			Nov.			Dec.								
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set																												
1	1003	2152	1007	0845	2315	1011	0027	1122	0044	1314	0063	1357	0004	1536	0025	1628	0155	1601	0247	1609	0452	1609	0606	1609	0606	1609	0606	1609	0606	1609	0606	1609	0606	1609	0606							
2	1032	2257	1044	0014	0927	1118	0122	1225	0119	1411	0109	1455	0034	1627	0114	1702	0258	1630	0352	1644	0605	1712	0719	1712	0719	1712	0719	1712	0719	1712	0719	1712	0719	1712	0719							
3	1101	1129	0125	1017	0027	1224	0207	1325	0148	1508	0135	1553	0108	1713	0268	1733	0401	1701	0458	1732	0720	1822	0825	1822	0825	1822	0825	1822	0825	1822	0825	1822	0825	1822	0825							
4	1131	0003	1221	0235	1115	0134	1329	0245	1423	0215	1605	0202	1650	0146	1755	0307	1803	0506	1733	0606	1830	0835	1936	0921	1936	0921	1936	0921	1936	0921	1936	0921	1936	0921	1936	0921						
5	1205	0112	1321	0340	1218	0233	1431	0317	1520	0240	1703	0233	1746	0231	1831	0409	1832	0610	1810	0717	1935	0943	2048	1008	2048	1008	2048	1008	2048	1008	2048	1008	2048	1008	2048	1008						
6	1245	0223	1427	0438	1325	0324	1530	0345	1616	0305	1800	0309	1833	0322	1903	0513	1903	0717	1854	0830	2044	1043	2156	1046	2156	1046	2156	1046	2156	1046	2156	1046	2156	1046	2156	1046						
7	1333	0335	1535	0527	1431	0407	1628	0611	1713	0331	1856	0349	1917	0418	1933	0616	1936	0825	1944	0944	2155	1132	2300	1119	2300	1119	2300	1119	2300	1119	2300	1119	2300	1119	2300	1119	2300	1119				
8	1430	0446	1643	0608	1536	0443	1725	0436	1811	0400	1949	0436	1956	0519	2002	0719	2014	0935	2043	1054	2302	1213	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148	1148		
9	1534	0551	1747	0643	1638	0514	1822	0501	1909	0432	2036	0529	2031	0620	2031	0823	2058	1046	2148	1157	1248	0001	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215	1215		
10	1644	0647	1849	0712	1737	0541	1920	0528	2006	0509	2118	0626	2101	0723	2101	0928	2150	1157	2256	1250	0007	1318	0100	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	1242	
11	1753	0734	1949	0739	1835	0607	2018	0558	2101	0551	2155	0726	2130	0825	2135	1035	2249	1303	2135	1335	0108	1345	0159	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	
12	1901	0812	2047	0805	1933	0632	2116	0631	2152	0639	2228	0827	2150	0927	2213	1145	2355	1402	0004	1413	0208	1412	0257	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	1340	
13	2004	0845	2144	0830	2030	0650	2213	0709	2238	0733	2258	0929	2227	1031	2259	1255	1453	0110	1445	0306	1439	0355	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414		
14	2105	0913	2241	0856	2128	0726	2307	0753	2318	0831	2326	1031	2258	1136	2354	1405	0103	1536	0213	1515	0404	1508	0452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	1452	
15	2203	0939	2339	0925	2227	0756	2356	0843	2354	0932	2355	1134	2333	1243	1510	0211	1612	0314	1542	0502	1539	0549	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536		
16	2300	1004	0957	2325	0831	0939	1034	1238	1345	0026	1136	0025	1345	0014	1506	0204	1656	0421	1712	0512	1636	0658	1654	0731	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718	1718
17	2356	1029	0938	1033	0911	0041	1039	0120	1141	0056	1240	0058	1456	0104	1616	0314	1737	0522	1739	0611	1705	0754	1739	0815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
18	1056	0136	1116	0126	0120	0116	0155	1245	0125	1345	0136	1610	0203	1721	0424	1812	0622	1806	0709	1738	0846	1829	0854	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914	1914
19	0053	1125	0232	1206	0114	1050	0155	1245	0155	1452	0222	1724	0310	1816	0530	1843	0721	1834	0808	1814	0934	1924	0928	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
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21	0250	1239	0412	1405	0246	1251	0257	1456	0227	1604	0317	1634	0422	1903	0634	1911	0821	1904	0906	1856	1016	2021	0959	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112
22	0348	1325	0453	1510	0325	1357	0327	1604	0303	1719	0422	1936	0533	1942	0735	1938	0920	1938	1001	1942	1033	2120	1027	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211	2211
23	0444	1419	0530	1617	0359	1503	0359	1716	0346	1835	0533	2028	0642	2015	0835	2005	1018	2016	1051	2034	1126	2219	1055	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311	2311
24	0535	1519	0604	1725	0431	1610	0433	1830	0437	1949	0645	2111	0748	2044	0934	2034	1115	2059	1137	2130	1156	2319	1122	2319	1122	2319	1122	2319	1122	2319	1122	2319	1122	2319	1122	2319	1122	2319	1122	2319		
25	0620	1623	0635	1833	0501	1719	0513	1947	0538	2056	0756	2146	0850	2111	1033	2105	1209	2148	1218	2229	1225	2229	1225	2229	1225	2229	1225	2229	1225	2229	1225	2229	1225	2229	1225	2229	1225	2229				
26	0659	1730	0705	1941	0532	1830	0600	2103	0646	2153	0902	2217	0950	2138	1132	2140	1258	2242	1254	2229	1253	0020	1225	0118	1225	0118	1225	0118	1225	0118	1225	0118	1225	0118	1225	0118	1225	0118	1225	0118	1225	
27	0734	1836	0735	2051	0605	1943	0655	2213	0757	2239	1005	2244	1049	2205	1230	2220	1343	2341	1327	00227	1304	0227	1304	0227	1304	0227	1304	0227	1304	0227	1304	0227	1304	0227	1304	0227	1304	0227	1304			
28	0806	1943	0808	2203	0641	2057	0758	2313																																		

POINT MUGU TIDES  
JANUARY 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
JANUARY 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT PST	TIME	HGT PST	TIME	HGT PST	DATE	TIME	HGT PST	TIME	HGT PST	DATE	TIME	HGT PST	TIME	HGT PST	
		FT		FT		FT			FT		FT					FT	FT
1	0027	3.9	0529	2.3	1111	4.9	1823	0.0	1	0040	3.6	0526	2.1	1124	4.5	1820	0.0
2	0104	4.1	0640	2.2	1206	4.2	1904	0.5	2	0117	3.8	0637	2.0	1219	3.9	1901	0.4
3	0151	4.4	0813	1.9	1325	3.3	1946	1.1	3	0204	4.0	0810	1.8	1338	3.2	1943	1.0
4	0242	4.8	0950	1.4	1514	3.0	2041	1.5	4	0255	4.4	0947	1.3	1527	2.7	2038	1.4
5	0338	5.2	1117	1.7	1712	2.9	2147	2.0	5	0351	4.8	1114	1.6	1725	2.6	2144	1.8
6	0434	5.6	1218	-1	1840	3.1	2256	2.2	6	0447	5.1	1215	-1	1853	2.8	2253	2.0
7	0529	6.0	1311	-8	1942	3.4	0002	2.2*	7	0542	5.5	1308	-7	1955	3.1	2359	2.0
8	0621	6.3	1359	-1.2	2030	3.6	---	---	8	0634	5.8	1356	-1.1	2043	3.3	---	---
9	0057	2.2	0710	6.5	1444	-1.5	2110	3.8	9	0054	2.0	0723	6.0	1441	-1.4	2123	3.5
10	0150	2.0	0757	6.6	1523	-1.5	2148	3.9	10	0147	1.8	0810	6.1	1520	-1.4	2201	3.6
11	0236	1.9	0839	6.5	1602	-1.4	2224	4.0	11	0233	1.8	0852	6.0	1559	-1.3	2237	3.7
12	0321	1.8	0921	6.2	1638	-1.2	2302	4.1	12	0318	1.7	0934	5.7	1635	-1.1	2315	3.8
13	0408	1.8	1003	5.8	1712	-1.7	2338	4.2	13	0405	1.7	1016	5.3	1709	-1.6	2351	3.9
14	0457	1.8	1045	5.2	1744	-1.2	---	---	14	0454	1.7	1058	4.8	1741	-1.2	---	---
15	0013	4.2	0549	1.9	1124	4.4	1815	4.4	15	0146	3.9	0546	1.8	1137	4.0	1812	4.4
16	0051	4.2	0651	2.0	1210	3.7	1844	1.0	16	0104	3.9	0649	1.8	1223	3.4	1841	3.9
17	0133	4.3	0811	1.9	1312	3.0	1915	1.5	17	0146	4.0	0808	1.8	1325	2.7	1912	4.4
18	0219	4.3	0957	1.7	1508	2.5	1944	2.0	18	0232	4.0	0954	1.6	1521	2.3	1941	1.8
19	0315	4.4	1127	1.2	1801	2.5	2039	2.4	19	0328	4.0	1124	1.1	1814	2.3	2036	2.2
20	0415	4.6	1226	-8	1924	2.8	2215	2.7	20	0428	4.2	1223	-7	1937	2.6	2212	2.5
21	0508	4.8	1308	-3	2002	3.1	2332	2.7	21	0521	4.4	1305	-3	2015	2.6	2329	2.5
22	0556	5.1	1343	-2	2024	3.3	---	---	22	0609	4.7	1340	-2	2037	3.0	---	---
23	0025	2.6	0638	5.5	1414	-5	2046	3.5	23	0022	2.4	0651	5.0	1411	-4	2059	3.2
24	0106	2.4	0713	5.8	1444	-8	2108	3.6	24	0103	2.2	0726	5.3	1441	-7	2121	3.3
25	0145	2.1	0749	6.0	1511	-1.0	2133	3.7	25	0142	1.9	0802	5.5	1508	-9	2146	3.4
26	0223	1.9	0824	6.0	1540	-1.0	2158	3.9	26	0220	1.8	0837	5.5	1537	-9	2211	3.6
27	0302	1.7	0902	6.0	1609	-1.0	2227	4.1	27	0259	1.6	0915	5.5	1606	-9	2240	3.8
28	0343	1.5	0941	5.8	1641	-7	2257	4.4	28	0340	1.4	0954	5.3	1638	-6	2310	4.0
29	0432	1.3	1020	5.3	1710	-3	2329	4.6	29	0429	1.2	1033	4.8	1707	-3	2342	4.2
30	0523	1.3	1109	4.6	1742	-3	---	---	30	0520	1.2	1122	4.2	1739	-3	---	---
31	0005	4.8	0629	1.2	1205	3.8	1814	9	31	0018	4.4	0626	1.1	1218	3.5	1811	8

\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

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POINT MUGU TIDES  
FEBRUARY 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT															
1	0051	4.9	0749	1.2	1322	3.1	1853	1.5	1	0104	4.5	0746	1.1	1335	2.8	1850	1.4
2	0146	5.0	0932	.9	1536	2.6	1938	2.1	2	0159	4.6	0929	.8	1549	2.4	1935	1.9
3	0256	5.1	1108	.3	1801	2.8	2111	2.5	3	0309	4.7	1105	.3	1814	2.6	2108	2.3
4	0413	5.3	1217	.3	1909	3.2	2258	2.6	4	0426	4.8	1214	.3	1922	2.9	2255	2.4
5	0522	5.7	1310	.8	1951	3.5	---	---	5	0535	5.2	1307	.7	2004	3.2	---	---
6	0013	2.3	0621	6.0	1352	-1.2	2023	3.7	6	0010	2.1	0634	5.5	1349	-1.1	2036	3.4
7	0107	2.0	0710	6.1	1430	-1.2	2051	4.0	7	0104	1.8	0723	5.6	1427	-1.1	2104	3.7
8	0153	1.6	0752	6.1	1503	-1.2	2120	4.2	8	0150	1.5	0805	5.6	1500	-1.1	2133	3.9
9	0236	1.4	0834	6.0	1535	-1.1	2148	4.4	9	0233	1.3	0847	5.5	1532	-1.0	2201	4.0
10	0314	1.2	0910	5.8	1603	-1.7	2216	4.5	10	0311	1.1	0923	5.3	1600	-1.6	2229	4.1
11	0356	1.2	0948	5.3	1628	-1.3	2242	4.5	11	0353	1.1	1001	4.8	1625	-1.3	2255	4.1
12	0435	1.2	1020	4.7	1654	-1.2	2310	4.5	12	0432	1.1	1033	4.3	1651	-1.2	2323	4.1
13	0517	1.2	1059	4.1	1715	-1.8	2338	4.5	13	0514	1.1	1112	3.8	1712	-1.7	2351	4.1
14	0606	1.2	1138	3.5	1734	-1.2	---	---	14	0607	1.1	1151	3.2	1731	-1.1	---	---
15	0006	4.4	0704	1.4	1231	2.8	1747	1.7	15	0019	4.0	0701	1.3	1244	2.6	1744	1.6
16	0043	4.3	0828	1.4	1424	2.3	1741	2.2	16	0056	4.0	0824	1.3	1437	2.1	1738	2.0
17	0136	4.2	1039	1.2	---	---	17	0149	3.9	1036	1.1	---	---	---	---	---	---
18	0303	4.2	1157	.8	---	---	18	0316	3.9	1154	.7	---	---	---	---	---	---
19	0427	4.4	1242	.3	1951	3.1	2319	2.8	19	0440	4.0	1239	.3	2004	2.8	2316	2.6
20	0530	4.8	1315	.1	1956	3.4	---	---	20	0543	4.4	1312	-.1	2009	3.1	---	---
21	0017	2.5	0617	5.2	1343	-.5	2010	3.6	21	0014	2.3	0630	4.8	1340	-.4	2023	3.3
22	0058	2.1	0654	5.5	1412	-.7	2029	3.8	22	0055	1.9	0707	5.0	1409	-.6	2042	3.5
23	0135	1.6	0736	5.8	1437	-.9	2051	4.2	23	0132	1.5	0749	5.3	1434	-.8	2104	3.9
24	0214	1.2	0812	5.8	1506	-.8	2112	4.5	24	0211	1.1	0825	5.3	1503	-.7	2125	4.1
25	0255	.8	0850	5.7	1534	-.6	2140	4.8	25	0252	.7	0903	5.2	1531	-.5	2153	4.4
26	0337	.5	0933	5.4	1559	-.3	2209	5.1	26	0334	.4	0946	4.9	1556	-.3	2222	4.7
27	0423	.3	1018	4.8	1631	-.2	2243	5.3	27	0420	.3	1031	4.4	1628	-.2	2256	4.8
28	0515	.2	1110	4.1	1703	-.8	2320	5.3	28	0512	.2	1123	3.8	1700	-.7	2333	4.8

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POINT MUGU TIDES  
MARCH 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
MARCH 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT	TIME	HGT	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	TIME	HGT	TIME	HGT
	PST	FT	PST	FT	PST	FT	PST	FT		PST	FT	PST	FT	PST	FT	PST	FT
1	0617	3	1213	3.4	1735	1.4	1810	2.0	1	0614	3	1226	3.1	1732	1.3	1807	1.8
2	0006	5.2	0736	4	1346	2.8	1628	2.5	2	0019	4.8	0733	.4	1359	2.6	1911	2.3
3	0106	5.0	0916	3	1815	3.1	2136	2.8	3	0119	4.6	0913	.3	1641	2.5	1828	2.8
4	0226	4.9	1052	0.0	1855	3.5	2322	2.5	4	0239	4.5	1049	0.0	1908	3.2	2133	2.6
5	0401	4.9	1201	-4	1925	3.7	-----	-----	5	0414	4.5	1158	-4	1938	3.4	2319	2.3
6	0518	5.2	1249	-7	1954	4.1	-----	-----	6	0531	4.8	1246	-6	1938	3.4	-----	-----
7	0025	2.0	0617	5.4	1331	-8	1903	4.1	7	0022	1.8	0630	4.9	1328	-7	2007	3.8
8	0113	1.5	0705	5.5	1403	-8	2019	4.3	9	0110	1.4	0718	5.0	1400	-7	2032	4.0
9	0154	1.2	0747	5.5	1432	-7	2042	4.6	10	0151	1.1	0800	5.0	1429	-6	2055	4.2
10	0229	.8	0823	5.3	1500	-4	2105	4.7	11	0226	.7	0836	4.8	1457	-4	2118	4.3
11	0305	.6	0857	5.0	1522	0.0	2127	4.8	12	0302	.5	0910	4.6	1519	0.0	2140	4.4
12	0340	.4	0932	4.6	1544	-4	2149	4.9	13	0337	.4	0945	4.2	1541	-4	2-02	4.5
13	0412	.4	1006	4.2	1604	8	2211	4.9	14	0409	.4	1019	3.9	1601	-7	2224	4.5
14	0451	.5	1043	3.6	1623	1.2	2233	4.8	15	0448	.4	1056	3.3	1620	1.1	2246	4.4
15	0530	.6	1124	3.2	1638	1.6	2300	4.6	16	0527	.5	1137	2.9	1635	1.5	2313	4.2
16	0622	.8	1221	2.7	1644	2.0	2333	4.4	17	0619	.7	1234	2.5	1641	1.8	2346	4.0
17	0735	1	-----	-----	-----	-----	-----	-----	18	0732	1.0	-----	-----	-----	-----	-----	
18	0016	4.2	0928	1.0	-----	-----	-----	-----	19	0029	3.9	0925	.9	-----	-----	-----	
19	0142	4.0	1101	.7	-----	-----	-----	-----	20	0155	3.7	1058	.6	-----	-----	-----	
20	0335	4.0	1151	.4	1905	3.3	2307	2.7	21	0348	3.7	1148	.4	1948	3.0	2304	2.5
21	0452	4.3	1226	0.0	1908	3.6	0001	2.2*	22	0505	4.0	1223	0.0	1921	3.3	2358	2.0
22	0543	4.7	1258	-3	1921	3.8	-----	-----	23	0339	1.5	1255	-3	1934	3.5	-----	-----
23	0042	1.6	0630	5.0	1326	-4	1939	4.3	24	0643	4.6	1323	-4	1952	4.0	-----	-----
24	0121	1.1	0715	5.2	1352	-4	2001	4.7	25	0118	1.0	0728	4.8	1349	-4	2014	4.3
25	0203	.4	0800	5.2	1424	-3	2026	5.2	26	0200	.4	0813	4.8	1421	-3	2039	4.3
26	0245	.2	0845	5.1	1453	0.0	2055	5.6	27	0242	.2	0858	4.7	1450	0.0	2108	5.1
27	0329	.6	0930	4.7	1524	-4	2117	5.8	28	0326	.5	0943	4.3	1521	.4	2140	5.3
28	0417	.8	1020	4.2	1556	9	2206	5.9	29	0414	.7	1033	3.9	1553	.8	2219	5.4
29	0510	.8	1120	3.6	1631	1.4	2245	5.7	30	0507	.7	1133	3.3	1628	1.3	2258	5.2
30	0611	.6	1233	3.2	1710	1.9	2334	5.4	31	0608	.5	1246	2.9	1707	1.8	2347	4.9
31	0728	.3	1420	2.9	1758	2.4	-----	-----	31	0725	.3	1433	2.6	1755	2.2	-----	-----

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POINT MUGU TIDES  
APRIL 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
APRIL 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT PST FT	TIME	HGT PST FT	TIME	HGT PST FT	DATE	TIME	HGT PST FT	TIME	HGT PST FT	DATE	TIME	HGT PST FT
1	0040	5.0	0854	-2	1630	3.0	1941	2.8	0053	4.6	0851	-2	1643	2.7
2	0209	4.6	1021	-2	1741	3.4	2205	2.6	0222	4.2	1018	-2	1754	3.1
3	0346	4.5	1124	-3	1814	3.7	2327	2.1	0359	4.1	1121	-3	1827	3.4
4	0508	4.6	1217	-4	1846	4.1	-	-	0521	4.2	1214	-4	1859	3.8
5	0025	1.5	0604	4.7	1254	-3	1914	4.4	0022	1.4	0617	4.3	1251	-3
6	0108	1.1	0654	4.7	1326	-1	1939	4.7	0105	1.0	0707	4.3	1927	4.0
7	0146	1.6	0735	4.6	1252	-2	1958	4.9	0143	1.5	0748	4.2	1952	4.3
8	0219	.3	0813	4.4	1415	-.5	2020	5.1	0216	-.3	0826	4.0	2011	4.5
9	0253	0.0	0849	4.2	1438	-.8	2039	5.2	0250	0.0	0902	3.9	2052	4.8
10	0325	-.1	0924	3.9	1500	1.2	2103	5.2	0322	-.1	0937	3.6	2116	4.8
11	0357	-.2	1001	3.6	1519	1.4	2122	5.2	0354	-.2	1014	3.3	2135	4.8
12	0433	1	1040	3.3	1540	1.7	2151	5.0	0430	1	1053	3.0	1537	4.6
13	0514	1	1128	3.0	1556	2.0	2216	4.8	0511	1	1141	2.7	1553	4.4
14	0600	1.3	1235	2.7	1603	2.3	2249	4.6	0557	1.3	1248	2.5	1600	4.2
15	0659	.5	2334	4.3	-	-	-	-	0656	4	2347	4.0	-	-
16	0818	.6	-	-	-	-	-	-	0815	5	-	-	-	-
17	0043	4.0	0938	-.5	1754	3.2	2044	3.0	0056	3.7	0935	4	1807	2.9
18	0226	3.9	1038	-.4	1748	3.5	2239	2.6	0239	3.6	1035	4	1801	3.2
19	0402	3.9	1120	-.2	1802	3.8	2337	1.9	0415	3.6	1117	2	1815	3.5
20	0509	4.1	1159	-.2	1822	4	-	-	0522	3.8	1156	2	1835	4
21	0022	1.2	0607	4.3	1231	1.2	1846	4.8	0019	1.1	0620	4.0	1228	4.2
22	0107	1.4	0659	4.4	1305	1.3	1912	5.4	0104	1.4	0712	4.0	1302	4.3
23	0149	-.3	0748	4.4	1339	-.5	1944	5.9	0146	-.3	0801	4.0	1336	4
24	0235	-.1	0840	4.3	1413	-.9	2019	6.1	0232	-.9	0853	4.0	2032	5.6
25	0320	-.1	0934	4.1	1451	1.2	2056	6.3	0317	1.2	0947	3.8	2109	5.9
26	0409	-.1	1030	3.7	1527	1.5	2138	6.2	0406	1.3	1043	3.4	1524	5.7
27	0504	-.1	1134	3.5	1612	1.9	2225	6.0	0501	1.2	1147	3.2	1609	5.5
28	0606	1.2	1249	3.3	1704	2.3	2321	5.6	0603	1.1	1302	3.0	1701	5.1
29	0712	-.8	1418	3.3	1814	2.6	-	-	0709	-.7	1431	3.0	1811	5.4
30	0024	5.0	0826	-.5	1542	3.5	2006	2.7	0037	4.6	0823	-.4	1555	3.2

\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

• -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES  
MAY 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
MAY 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	DATE	TIME	HGT	
	PST	FT	PST	FT	PST	FT		PST	FT	PST	FT		PST	FT	
1	0150	4.5	0936	-2	1642	3.8	2158	2.4	1	0203	4.1	0833	-2	1655	3.5
2	0323	4.1	1036	0.0	1724	4.1	2315	1.8	2	0336	3.8	1033	0.0	1737	3.8
3	0439	3.9	1123	-2	1757	4.5	1828	4.8	3	0452	3.6	1120	-2	1810	4.1
4	0012	1.2	0545	3.9	1205	5.5	1852	5.0	4	0009	1.1	0558	3.6	1202	4
5	0058	1.8	0641	3.8	1237	6.8	1915	5.2	5	0055	1.7	0654	3.5	1234	4.7
6	0137	3	0727	3.7	1306	1.1	1939	5.3	6	0134	1.3	0740	3.4	1303	1.0
7	0209	0.0	0808	3.6	1331	1.3	1939	5.3	7	0206	0.0	0821	3.3	1328	1.2
8	0241	-3	0847	3.6	1356	1.5	2001	5.4	8	0238	-3	0900	3.3	1353	1.4
9	0316	-5	0928	3.4	1418	1.8	2026	5.5	9	0313	-4	0941	3.1	1415	1.7
10	0348	-5	1010	3.3	1443	2.0	2052	5.4	10	0345	-4	1023	3.0	1440	1.8
11	0424	-4	1051	3.1	1508	2.2	2124	5.3	11	0421	-4	1104	2.8	1505	2.0
12	0502	-3	1142	3.0	1533	2.4	2154	5.1	12	0459	-3	1155	2.7	1530	2.2
13	0547	-2	1243	2.9	1559	2.6	2230	4.9	13	0544	-2	1256	2.6	1556	2.4
14	0637	0.0	1406	2.9	1644	2.8	2315	4.6	14	0634	0.0	1419	2.6	1641	2.6
15	0729	0.2	1515	3.1	1814	3.0	2052	5.4	15	0726	-2	1528	2.8	1811	2.7
16	0015	4.2	0826	-3	1557	3.5	2022	2.9	16	0028	3.9	0823	3	1610	3.2
17	0136	3.6	0918	-4	1629	3.7	2205	2.4	17	0149	3.5	0915	-4	1642	3.4
18	0309	3.6	1008	-6	1654	4.2	2311	1.6	18	0322	3.3	1005	-5	1707	3.9
19	0435	3.6	1052	-7	1724	4.8	0004	-8*	19	0448	3.3	1049	-6	1737	4.4
20	0545	3.6	1134	9	1756	5.4	1826	5.9	20	0548	3.3	1131	-8	1809	4.9
21	0052	-1	0649	3.7	1216	1.2	1216	1.2	21	0049	-1	0702	3.4	1213	1.1
22	0140	-8	0749	3.7	1258	1.3	1911	6.3	22	0137	-7	0802	3.4	1255	1.2
23	0229	-1.3	0844	3.7	1340	1.5	1952	6.6	23	0226	-1.2	0857	3.4	1337	1.4
24	0315	-1.7	0940	3.7	1422	1.7	2036	6.7	24	0317	-1.6	0953	3.4	1419	1.6
25	0407	-1.8	1035	3.6	1511	1.9	2122	6.5	25	0404	-1.7	1048	3.3	1508	1.8
26	0459	-1.6	1134	3.6	1604	2.2	2214	6.1	26	0456	-1.5	1147	3.3	1601	2.0
27	0552	-1.3	1240	3.6	1704	2.4	2307	5.7	27	0549	-1.2	1253	3.3	1701	2.2
28	0648	-1.0	1341	3.6	1821	2.5	1821	2.5	28	0645	-1.9	1354	3.3	1818	2.3
29	0006	5.0	0744	-5	1444	3.8	1952	2.5	29	0019	4.6	0741	-4	1457	3.5
30	0119	4.3	0839	0.0	1540	4.1	2130	2.2	30	0132	4.0	0836	0.0	1553	3.8
31	0241	3.7	0934	-5	1625	4.4	2251	1.7	31	0254	3.4	0931	-4	1638	4.0

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0040	-6	1014	3.3	1420	2.4	2036	5.7	0910	-4	0949	3.0	1317	2.0	1947	5.1
0415	-6	1050	3.3	1456	2.4	2110	5.6	0302	-4	0337	-5	1027	3.0	1349	2.1
0451	-6	1132	3.3	1534	2.5	2145	5.5	0412	-5	0418	-5	1103	3.0	1453	2.2
0526	-5	1216	3.4	1617	2.6	2222	5.2	10	0448	-5	1145	3.0	1531	2.3	
0605	-3	1301	3.5	1713	2.7	2303	4.8	11	0523	-4	1229	3.1	1614	2.4	
0644	0	1342	3.6	1824	2.7	2356	4.3	12	0602	-3	1314	3.2	1710	2.5	
0724	3	1424	3.9	1955	2.5	2126	2.0	13	0641	0.0	1355	3.3	1821	2.5	
0104	3.8	0809	1.6	1509	4.3	2247	1.3	14	0721	-3	1437	3.6	1952	2.3	
0232	3.4	0858	1.0	1550	4.7	2351	1.5	15	0117	3.5	0806	5	1522	4.0	
0414	3.2	0949	1.3	1632	5.3	2351	1.6	16	0245	3.1	0855	9	1603	4.3	
0543	3.2	1042	1.6	1716	5.8	2115	1.7	17	0427	2.9	0946	1.2	1645	4.8	
19	0046	-3	0657	3.3	1137	1.9	1804	6.2	18	0556	2.9	1039	1.5	1729	5.3
20	0135	-1.0	0758	3.5	1229	2.0	1850	6.6	19	0043	-3	0710	3.0	1134	1.8
21	0224	-1.4	0852	3.6	1322	2.0	1939	6.8	20	0132	-9	0811	3.2	1226	1.8
22	0313	-1.7	0941	3.7	1414	2.0	2025	6.8	21	0221	-1.3	0905	3.3	1952	6.2
23	0359	-1.7	1030	3.8	1507	2.0	2115	6.6	22	0310	-1.6	0954	3.4	2038	6.2
24	0444	-1.5	1115	3.9	1601	2.1	2203	6.2	23	0356	-1.6	1043	3.5	1504	1.8
25	0528	-1.2	1203	4.0	1657	2.1	2251	5.7	24	0441	-1.4	1128	3.6	1558	1.9
26	0613	-1.7	1251	4.1	1803	2.2	2343	5.0	25	0525	-1.1	1216	3.7	1654	1.9
27	0656	-1	1338	4.3	1918	2.2	27	0610	-6	1304	3.8	1800	2.0	2356	4.6
28	0042	4.2	0736	.5	1427	4.4	2044	2.1	28	0653	-1	1351	4.0	1915	2.0
29	0151	3.5	0818	1.1	1515	4.6	2216	1.7	29	0055	3.9	0733	4	1440	4.0
30	0328	3.0	0907	1.6	1601	4.8	2332	1.2	30	0341	2.7	0904	1.5	1614	4.4

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POINT MUGU TIDES  
AUGUST 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
AUGUST 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT PST	TIME	HGT FT	TIME	HGT PST	TIME	HGT FT	DATE	TIME	HGT PST	TIME	HGT PST	TIME	HGT PST	TIME	HGT PST	DATE	TIME	HGT PST	TIME	HGT PST	
1	0054	.6	0746	3.3	1119	2.9	1740	5.2	1	0051	.5	0759	3.0	1116	2.6	1753	4.8						
2	0130	.2	0815	3.5	1217	2.8	1825	5.5	2	0127	.2	0828	3.2	1214	2.6	1838	5.0						
3	0202	.1	0833	3.6	1256	2.6	1902	5.8	3	0159	-.1	0846	3.3	1253	2.4	1915	5.3						
4	0230	-.4	0855	3.8	1335	2.4	1939	6.0	4	0227	-.4	0908	3.5	1332	2.2	1952	5.5						
5	0258	-.5	0917	3.9	1411	2.1	2014	6.0	5	0255	-.4	0930	3.6	1408	1.9	2027	5.5						
6	0324	-.5	0942	4.2	1450	1.9	2046	6.0	6	0321	-.4	0955	3.9	1447	1.8	2059	5.5						
7	0352	-.4	1006	4.4	1529	1.7	2123	5.8	7	0349	-.4	1019	4.0	1526	1.6	2136	5.3						
8	0417	-.2	1032	4.6	1612	1.5	2203	5.4	8	0414	-.2	1045	4.2	1609	1.4	2216	4.9						
9	0446	-.2	1101	4.8	1701	1.4	2245	4.8	9	0443	-.2	1114	4.4	1658	1.3	2258	4.4						
10	0515	-.7	1134	5.0	1758	1.3	2338	4.1	10	0512	-.6	1147	4.6	1755	1.2	2351	3.8						
11	0544	1.2	1216	5.1	1909	1.3	---	---	11	0541	1.1	1229	4.7	1906	1.2	---	---						
12	0047	3.5	0616	1.7	1303	5.2	2041	1.2	12	0100	3.2	0613	1.6	1316	4.8	2038	1.1						
13	0239	2.9	0659	2.3	1409	5.3	2221	-.8	13	0252	2.6	0656	2.1	1422	4.8	2218	.7						
14	0511	3.0	0814	2.7	1527	5.5	2340	-.2	14	0524	2.7	0811	2.5	1540	5.0	2337	.2						
15	0639	3.3	1011	2.9	1642	5.8	---	---	15	0652	3.0	1008	2.6	1655	5.3	---	---						
16	0036	-.4	0721	3.6	1137	2.7	1748	6.1	16	0033	-.4	0734	3.3	1134	2.5	1801	5.6						
17	0121	-.8	0753	4.0	1238	2.3	1841	6.3	17	0118	-.7	0806	3.7	1235	2.1	1854	5.8						
18	0203	-.9	0824	4.3	1329	1.9	1930	6.4	18	0200	-.8	0837	4.0	1326	1.8	1943	5.9						
19	0239	-.9	0853	4.6	1414	1.5	2014	6.3	19	0236	-.8	0906	4.2	1411	1.4	2027	5.8						
20	0312	-.7	0922	4.8	1458	1.3	2056	6.1	20	0309	-.6	0935	4.4	1455	1.2	2109	5.6						
21	0343	-.4	0950	5.0	1540	1.2	2135	5.7	21	0340	-.4	1003	4.6	1537	1.1	2148	5.2						
22	0412	1	1019	5.1	1622	1.2	2214	5.1	22	0409	-.1	1032	4.7	1619	1.1	2227	4.7						
23	0437	-.6	1049	5.1	1704	1.2	2253	4.4	23	0434	-.5	1102	4.7	1701	1.1	2306	4.0						
24	0502	1.2	1118	5.0	1755	1.3	2336	3.8	24	0459	1.1	1131	4.6	1752	1.2	2349	3.5						
25	0521	1.7	1150	4.9	1855	1.5	---	---	25	0518	1.6	1203	4.5	1852	1.4	---	---						
26	0037	3.2	0542	2.2	1229	4.7	2018	1.6	26	0050	2.9	0539	2.0	1242	4.3	2015	1.5						
27	0239	2.8	0541	2.7	1322	4.5	2211	1.4	27	0252	2.6	0538	2.5	1335	4.1	2208	1.3						
28	1445	4.5	2332	1.1	---	---	---	---	28	1458	4.1	2329	1.0	---	---	---	---						
29	1615	4.6	---	---	---	---	---	---	29	1628	4.2	---	---	---	---	---	---						
30	0022	.7	0726	3.6	1116	3.1	1717	5.0	30	0019	.6	0739	3.3	1113	2.8	1730	4.6						
31	0058	.4	0739	3.7	1209	2.8	1803	5.3	31	0055	.4	0752	3.4	1206	2.6	1816	4.8						

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POINT MUGU TIDES  
SEPTEMBER 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

DATE	TIME	HGT PST	TIME	HGT PST	TIME	HGT PST	DATE	TIME	HGT PST	TIME	HGT PST	DATE	TIME	HGT PST	TIME	HGT PST	TIME	HGT PST	TIME	HGT PST
1	0126	1	0751	3.9	1249	2.4	1842	5.6	1	0123	-1	0804	3.6	1246	2.2	1855	5.1			
2	0152	-1	0809	4.2	1325	2.0	1920	5.8	2	0149	-1	0822	3.9	1322	1.8	1933	5.3			
3	0217	-2	0827	4.5	1400	1.5	1955	5.9	3	0214	-2	0840	4.1	1357	1.4	2008	5.4			
4	0243	-1	0849	4.9	1436	1.2	2034	5.8	4	0240	-1	0902	4.5	1433	1.1	2047	5.3			
5	0311	0	0914	5.2	1517	.9	2113	5.5	5	0308	0.0	0927	4.8	1514	.8	2126	5.0			
6	0336	-4	0943	5.4	1600	.6	2158	5.0	6	0333	-4	0956	4.9	1557	.5	2211	4.6			
7	0405	-8	1014	5.6	1648	.5	2244	4.4	7	0402	-7	1027	5.1	1645	.4	2257	4.0			
8	0433	1.2	1046	5.7	1747	.5	2344	3.7	8	0430	1.1	1059	5.2	1744	.4	2357	3.4			
9	0505	1.8	1128	5.6	1856	.6	2029	6.0	9	0502	1.7	1141	5.1	1853	.5	2026	5.5			
10	0109	3.2	0539	2.4	1224	5.5	2029	6.0	10	0122	2.9	0536	2.2	1237	5.0	2026	5.5			
11	0333	3.1	0629	2.9	1342	5.3	2208	4.1	11	0346	2.8	0626	2.6	1355	4.8	2205	4.4			
12	0534	3.4	0849	3.2	1517	5.3	2322	0.0	12	0547	3.1	0846	2.9	1530	4.8	2319	0.0			
13	0620	3.7	1043	2.9	1640	5.5	2029	6.0	13	0633	3.4	1040	2.6	1653	5.0	2055	5.5			
14	0017	-3	0654	4.1	1153	2.4	1746	5.7	14	0014	-3	0707	3.8	1150	2.2	1759	5.2			
15	0057	-4	0724	4.5	1246	1.9	1838	5.9	15	0054	-4	0737	4.1	1243	1.8	1851	5.4			
16	0135	-4	0749	4.8	1330	1.4	1923	5.8	16	0132	-4	0802	4.4	1327	1.3	1936	5.3			
17	0204	-2	0814	5.1	1409	1.0	2003	5.7	17	0201	-2	0827	4.7	1406	.9	2016	5.2			
18	0233	-1	0839	5.3	1448	.7	2042	5.4	18	0230	-1	0852	4.8	1445	.6	2055	4.9			
19	0301	-5	0903	5.5	1524	.6	2121	5.0	19	0258	-4	0916	5.0	1521	.5	2134	4.6			
20	0323	-9	0926	5.5	1559	.5	2158	4.5	20	0320	-8	0939	5.0	1556	.4	2211	4.1			
21	0345	1.3	0951	5.4	1638	.6	2236	4.0	21	0342	1.2	1004	4.9	1635	.5	2249	3.7			
22	0406	1.8	1016	5.3	1720	8	2321	3.6	22	0403	1.7	1029	4.8	1717	.7	2334	3.3			
23	0425	2.2	1043	5.1	1813	1.1	2321	3.6	23	0422	2.0	1056	4.7	1810	1.0	2055	4.9			
24	0027	3.1	0430	2.6	1113	4.8	1925	1.2	24	0040	2.8	0427	2.4	1126	4.4	1922	1.1			
25	1203	4.5	2108	1.2	---	---	---	---	25	1216	4.1	2105	1.1	---	---	---	---	---	---	
26	1327	4.3	2237	1.1	---	---	---	---	26	1340	4.0	2234	1.0	---	---	---	---	---	---	
27	0657	3.6	0936	3.5	1515	4.3	2330	.8	27	0710	3.3	0933	3.2	1528	4.0	2327	.7			
28	0642	3.7	1109	3.1	1639	4.5	0007	.5*	28	0655	3.4	1106	2.8	1652	4.1	0004	.4*			
29	0646	4.0	1156	2.6	1730	4.8	---	---	29	0659	3.7	1153	2.4	1743	4.4	---	---	---	---	
30	0038	-4	0700	4.3	1231	2.0	1817	5.1	30	0035	.4	0713	4.0	1228	1.8	1830	4.7			

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POINT MUGU TIDES  
OCTOBER 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - RARGE BEACH TIDES  
OCTOBER 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	
	PST	FT	PST	FT	PST	FT		PST	FT	PST	FT		PST	FT	PST	FT	
1	0103	.3	0716	4.7	1310	1.4	1858	5.3	1	0100	.3	0729	4.3	1307	1.3	1911	4.8
2	0129	.3	0738	5.1	1347	.9	1940	5.3	2	0126	.3	0751	4.7	1344	.8	1953	4.8
3	0157	.4	0803	5.6	1423	.3	2023	5.2	3	0154	.4	0816	5.1	1420	.3	2036	4.8
4	0225	.7	0828	6.0	1506	-.1	2107	4.9	4	0222	.6	0841	5.5	1503	-.1	2120	4.5
5	0254	1.0	0900	6.1	1551	-.4	2156	4.5	5	0251	.9	0913	5.6	1548	-.4	2209	4.1
6	0326	1.4	0935	6.2	1640	-.5	2252	4.0	6	0323	1.3	0948	5.7	1637	-.4	2305	3.7
7	0401	1.9	1014	6.1	1739	-.3	---	7	0358	1.8	1027	5.6	1736	-.3	---	---	
8	0003	3.6	0433	2.3	1059	6.0	1851	-.1	8	0016	3.3	0430	2.1	1112	5.5	1848	-.1
9	0141	3.3	0526	2.8	1200	5.6	2016	1	9	0154	3.0	0523	2.6	1213	5.1	2013	1
10	0346	3.4	0659	3.2	1326	5.1	2140	-.1	10	0359	3.1	0656	2.9	1339	4.7	2137	1
11	0501	3.7	0922	3.1	1505	4.9	2250	0.0	11	0514	3.4	0919	2.8	1518	4.5	2247	0.0
12	0543	4.2	1055	2.6	1631	4.9	2340	0.0	12	0556	3.9	1052	2.4	1644	4.5	2337	0.0
13	0615	4.6	1156	2.0	1737	5.0	---	13	0628	4.2	1153	1.8	1750	4.6	---	---	
14	0025	1	0645	5.0	1244	1.3	1830	5.0	14	0022	1	0658	4.6	1241	1.2	1843	4.6
15	0057	3	0710	5.3	1326	-.9	1915	4.9	15	0054	3	0723	4.8	1323	8	1928	4.5
16	0126	6	0734	5.5	1402	-.5	1957	4.7	16	0123	5	0747	5.0	1359	4	2010	4.3
17	0153	1.0	0757	5.7	1440	-.2	2036	4.5	17	0150	-.9	0810	5.2	1437	2	2049	4.1
18	0216	1.2	0821	5.8	1512	0.0	2114	4.2	18	0213	1.1	0834	5.3	1509	0.0	2127	3.9
19	0240	1.6	0843	5.8	1544	0.0	2151	3.9	19	0237	1.5	0856	5.3	1541	0.0	2204	3.6
20	0302	1.9	0906	5.7	1620	1	2233	3.6	20	0259	1.8	0919	5.2	1617	1	2246	3.3
21	0317	2.2	0933	5.5	1702	-.3	2323	3.3	21	0314	2.0	0946	5.0	1659	-.3	2336	3.0
22	0335	2.5	1000	5.3	1747	5	---	22	0332	2.3	1013	4.8	1744	4	---	---	
23	0039	3.1	0350	2.8	1032	5.0	1848	-.8	23	0052	2.8	0347	2.6	1045	4.6	1845	.7
24	1117	4.7	2002	-.9	---	---	---	24	1130	4.3	1959	-.8	---	---	---	---	
25	1220	4.3	2118	-.9	---	---	---	25	1233	4.0	2115	-.8	---	---	---	---	
26	0531	3.6	0855	3.5	1402	4.1	2214	.8	26	0544	3.3	0852	3.2	1415	3.8	2211	.7
27	0538	3.8	1036	3.0	1542	4.1	2300	-.8	27	0551	3.5	1033	2.7	1555	3.8	2257	.7
28	0546	4.2	1130	2.3	1652	4.2	2335	-.7	28	0559	3.9	1127	2.1	1705	3.9	2332	.6
29	0604	4.7	1212	1.6	1748	4.3	0007	-.8	29	0617	4.3	1209	1.5	1801	4.0	0004	.7
30	0624	5.2	1251	.9	1839	4.5	---	30	0637	4.8	1248	.8	1852	4.1	---	---	
31	0039	.9	0649	5.7	1332	1	1928	4.5	31	0036	.8	0702	5.2	1329	1	1941	4.1

\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES  
NOVEMBER 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
NOVEMBER 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT
PST	FT	PST	FT	PST	FT	PST	PST	FT	PST	PST	FT	PST	PST	FT	PST	FT
1	0111	1.1	0718	6.1	1414	-5	2020	4.4	0108	1.0	0731	5.6	1411	-4	2033	4.0
2	0146	1.2	0752	6.5	1457	-1.0	2109	4.3	0143	1.1	0805	6.0	1454	-0.9	2122	4.0
3	0221	1.5	0829	6.7	1545	-1.2	2203	4.0	0218	1.4	0842	6.2	1542	-1.1	2216	3.7
4	0300	1.9	0908	6.7	1638	-1.2	2302	3.7	0257	1.8	0921	6.2	1635	-1.1	2315	3.4
5	0339	2.2	0956	6.7	1734	-1.0	---	---	0336	2.0	1009	6.0	1731	-0.9	---	---
6	0015	3.6	0428	2.6	1046	6.0	1838	-7	0028	3.3	0425	2.4	1059	5.5	1835	-6
7	0134	3.6	0533	2.9	1149	5.6	1949	-3	0147	3.3	0530	2.6	1202	5.1	1946	-3
8	0304	3.7	0720	3.1	1307	5.0	2058	0.0	0317	3.4	0717	2.8	1320	4.6	2055	0.0
9	0406	4.1	0917	2.8	1440	4.5	2202	2	0419	3.8	0914	2.6	1453	4.1	2159	-2
10	0454	4.5	1048	2.2	1609	4.2	2253	-5	0507	4.1	1045	2.6	1622	3.9	2250	-4
11	0530	4.9	1150	1.5	1722	4.1	2337	-8	0543	4.5	1147	1.4	1735	3.8	2334	-7
12	0604	5.2	1239	1.0	1822	4.0	---	---	0617	4.8	1236	0.9	1835	3.7	---	---
13	0014	1.1	0630	5.5	1321	-5	1914	3.9	0011	1.0	0643	5.0	1318	-4	1927	3.6
14	0046	1.4	0657	5.7	1359	-1	2000	3.8	0043	1.3	0710	5.2	1356	-1	2013	3.5
15	0111	1.6	0723	5.8	1431	-1.2	2039	3.7	0108	1.5	0736	5.3	1428	-2	2052	3.4
16	0139	1.9	0748	5.9	1503	-3	2118	3.6	0136	1.8	0801	5.4	1500	-3	2131	3.3
17	0204	2.1	0812	5.9	1536	-4	2200	3.6	0201	1.9	0825	5.4	1533	-4	2213	3.3
18	0230	2.3	0841	5.8	1611	-3	2239	3.4	0227	2.1	0854	5.3	1608	-3	2252	3.1
19	0255	2.5	0910	5.7	1649	-2	2328	3.3	0252	2.3	0923	5.2	1646	-2	2341	3.0
20	0321	2.7	0941	5.5	1731	0.0	---	---	0318	2.5	0954	5.0	1728	0.0	---	---
21	0027	3.2	0353	2.9	1013	5.2	1814	-2	0040	2.9	0429	2.6	1026	4.8	1811	-2
22	0136	3.2	0432	3.1	1055	4.8	1906	-4	022	0.9	0428	2.8	1108	4.4	1903	-4
23	0245	3.4	0544	3.2	1147	4.4	1958	-6	0258	3.1	0541	2.9	1200	4.0	1955	-5
24	0334	3.6	0756	3.2	1256	4.0	2047	-8	0347	3.3	0753	2.9	1309	3.7	2044	-7
25	0406	3.9	0948	2.8	1433	3.6	2140	1.0	0419	3.6	0945	2.6	1446	3.3	2137	-9
26	0434	4.4	1058	2.0	1610	3.6	2223	1.2	0447	4.0	1055	1.8	1623	3.3	2220	1.1
27	0503	4.9	1153	1.2	1725	3.6	2306	1.3	0516	4.5	1150	1.1	1738	3.3	2303	1.2
28	0536	5.5	1238	-4	1831	3.6	2351	1.5	0549	5.0	1235	-4	1844	3.3	2348	1.4
29	0609	6.0	1321	-4	1927	3.8	---	---	0622	5.5	1318	-4	1940	3.5	---	---
30	0032	1.6	0647	6.4	1406	-1.1	2024	3.8	0029	1.5	0700	5.9	1403	-1.0	2037	3.5

\* -- TIDE OCCURS ON NEXT DATE.  
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\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES  
DECEMBER 1990  
34 DEG 07 MIN N. 119 DEG 07 MIN W - OCEAN PIER

SNI - BARGE BEACH TIDES  
DECEMBER 1990  
33 DEG 13 MIN N. 119 DEG 27 MIN W - SOUTHEAST BEACH

DATE	TIME	HGT	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	TIME	HGT
PST	FT	PST	FT	PST	FT	PST	FT	PST	FT	PST	FT	PST	FT
1	0114	1.8	0729	6.8	1452	-1.4	2113	3.9	1	0111	1.7	0742	6.2
2	0159	1.9	0811	7.0	1543	-1.6	2208	3.8	2	0156	1.8	0824	6.4
3	0245	2.0	0858	6.9	1632	-1.6	2304	3.8	3	0242	1.8	0911	6.3
4	0337	2.2	0946	6.6	1721	-1.3	---	---	4	0334	2.0	0959	6.1
5	0003	3.8	0433	2.4	1040	6.1	1814	-1.0	5	0016	3.5	0430	2.2
6	0102	3.9	0542	2.5	1136	5.5	1910	-1.5	6	0115	3.6	0539	2.3
7	0201	4.0	0708	2.6	1242	4.7	2003	-1.1	7	0214	3.7	0705	2.4
8	0300	4.3	0846	2.4	1404	4.0	2059	-1.6	8	0313	4.0	0843	2.2
9	0352	4.6	1022	1.9	1534	3.6	2150	1.1	9	0405	4.2	1019	1.8
10	0439	4.9	1138	1.3	1707	3.3	2242	1.4	10	0452	4.5	1135	1.2
11	0516	5.2	1230	1.8	1822	3.3	2328	1.8	11	0529	4.8	1227	1.7
12	0553	5.4	1313	1.3	1921	3.4	00C7	2.1*	12	0606	4.9	1310	3.1
13	0625	5.6	1351	-1	2012	3.4	00C7	2.1*	13	0638	5.1	1348	-1
14	0042	2.2	0655	5.7	1426	-1.4	2051	3.5	14	0039	2.0	0708	5.2
15	0114	2.3	0726	5.8	1457	-1.5	2126	3.5	15	0111	2.1	0739	5.3
16	0146	2.4	0755	5.9	1529	-1.6	2158	3.5	16	0143	2.2	0808	5.4
17	0218	2.4	0827	5.9	1602	-1.6	2323	3.5	17	0215	2.2	0840	5.4
18	0250	2.5	0900	5.8	1633	-1.5	2309	3.5	18	0247	2.3	0913	5.3
19	0325	2.5	0932	5.6	1707	-1.4	2351	3.5	19	0322	2.3	0945	5.1
20	0404	2.6	1004	5.4	1742	-1.2	---	---	20	0401	2.4	1017	4.9
21	0026	3.6	0449	2.7	1041	5.0	1814	-1	21	0039	3.3	0446	2.5
22	0108	3.6	0550	2.7	1123	4.4	1853	-1	22	0121	3.3	0547	2.5
23	0150	3.9	0711	2.6	1221	3.8	1928	-1.8	23	0203	3.6	0708	2.4
24	0232	4.2	0849	2.3	1344	3.3	2014	1.2	24	0245	3.9	0846	2.1
25	0318	4.6	1022	1.6	1536	3.0	2106	1.5	25	0331	4.2	1019	1.5
26	0405	5.0	1131	1.9	1724	3.0	2208	1.9	26	0418	4.6	1128	.8
27	0450	5.6	1227	0.0	1838	3.2	2308	4.1	27	0503	5.1	1224	0.0
28	0540	6.0	1318	-1.8	1942	3.4	0007	2.1*	28	0553	5.5	1315	-1.7
29	0628	6.5	1404	-1.3	2031	3.6	---	---	29	0641	6.0	1401	-1.2
30	0058	2.1	0716	6.8	1450	-1.7	2114	3.8	30	0055	1.9	0729	6.2
31	0154	2.0	0805	7.0	1535	-1.8	2200	3.9	31	0151	1.8	0818	6.4

\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

\* -- TIDE OCCURS ON NEXT DATE.  
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

Latitude 22° 02' N  
Longitude 159° 47' W

Barking Sands Training Area, Kauai, Hawaiian Islands  
Moonrise and Moonset for 1990  
Hawaii-Aleutian Standard Time

Nautical Almanac Office  
U.S. Naval Observatory  
Washington, D.C. 20392-5100

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
Day	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set		
h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m		
1	1042	2246	1113	0956	2338	1135	0042	1232	0108	1359	0130	1426	0107	
2	1117	2344	1158	0041	1045	1238	0138	1328	0148	1449	0201	1518	0143	
3	1153	1248	1248	0146	1140	0044	1339	0227	1421	0224	1540	0234	1612	0222
4	1232	0042	1345	0251	1240	0148	1437	0310	1512	0257	1631	0308	1705	0306
5	1313	0144	1446	0354	1342	0248	1532	0348	1603	0328	1724	0344	1758	0353
6	1401	0248	1549	0453	1444	0342	1625	0422	1653	0400	1818	0425	1848	0445
7	1455	0355	1653	0546	1544	0429	1716	0455	1744	0432	1911	0509	1935	0621
8	1555	0502	1754	0632	1662	0510	1806	0526	1836	0507	2003	0558	2018	0636
9	1659	0605	1851	0712	1737	0547	1857	0558	1929	0545	2052	0651	2058	0733
10	1805	0704	1946	0748	1829	0621	1948	0631	2023	0626	2137	0746	2135	0829
11	1908	0754	2038	0822	1921	0653	2041	0706	2116	0712	2219	0842	2210	0924
12	2008	0838	2129	0853	2012	0725	2134	0745	2207	0802	2257	0938	2245	1020
13	2105	0917	2220	0925	2103	0757	2228	0828	2254	0855	2333	1033	2321	1116
14	2158	0952	2311	0958	2155	0831	2320	0915	2338	0951	1128	2359	1214	0019
15	2249	1024	1032	2248	0907	1006	1046	0009	1224	1315	0117	1525	0322	1641
16	2339	1055	0004	1110	2342	0947	0011	1101	0019	1142	0044	1321	0042	1419
17		1127	0057	1152	1032	0058	1157	0057	1239	0121	1421	0130	1525	0325
18	0010	1200	0151	1239	0035	1121	0141	1254	0134	1335	0202	1525	0431	1803
19	0121	1236	0245	1330	0128	1214	0222	1352	0209	1433	0248	1633	0327	1736
20	0214	1315	0338	1426	0218	1310	0300	1450	0247	1533	0341	1742	0434	1837
21	0308	1359	0428	1525	0305	1408	0338	1549	0326	1637	0441	1850	0541	1926
22	0403	1449	0514	1625	0348	1508	0415	1649	0411	1745	0547	1953	0646	2010
23	0457	1543	0557	1725	0429	1607	0454	1753	0501	1855	0655	2049	0748	2050
24	0549	1641	0637	1825	0507	1707	0537	1900	0559	2006	0802	2136	0846	2125
25	0638	1741	0715	1926	0545	1808	0625	2010	0702	2112	0905	2218	0941	2159
26	0722	1841	0752	2026	0624	1911	0719	2121	0810	2211	1004	2255	1034	2232
27	0803	1941	0831	2128	0704	2016	0818	2228	0916	2301	1059	2329	1126	2306
28	0842	2039	0911	2232	0749	2123	0923	2329	1020	2345	1152	1218	1241	1341
29	0918	2138	0838	2232	1028	1120	1243	0001	1310	1433	0028	1524	0155	1509
30	0955	2237	0933	2339	1132	0023	1215	0023	1334	0034	1403	0019	1522	0120
31	1032	2338			1033		1308	0057			1457	0101	1608	0215

1625 0425

1828 0721

**PORT ALLEN TIDES**  
**JANUARY 1990**  
**21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY**

**PORT ALLEN TIDES**  
**FEBRUARY 1990**  
**21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY**

DATE	TIME	HGT AHST	TIME	HGT AHST	TIME	HGT AHST	DATE	TIME	HGT AHST	TIME	HGT AHST	DATE	TIME	HGT AHST	TIME	HGT AHST
1	0616	1.7	1346	1	1933	.9	1	0215	.6	0651	.9	1354	1	2126	1.4	
2	0026	.4	0733	1.3	1457	0.0	2	0440	.6	0729	.7	1440	0.0	2245	1.6	
3	0154	.6	0822	1.0	1536	-.1	3	1542	0.0	---	---	---	---	---	---	
4	0356	.8	0924	.8	1622	-.1	4	2350	1.8*	0813	.3	1102	.4	1649	0.0	
5	0611	.7	0750	.5	1047	.6	5	0046	1.9	0845	.3	1232	.4	1754	0.0	
6	0006	1.7	0850	.3	1206	.5	6	0133	2.0	0916	.2	1330	.5	1854	0.0	
7	0059	2.0	0932	.3	1315	.5	7	0215	2.0	0942	.1	1420	.6	1944	0.0	
8	0146	2.1	1011	.2	1413	.5	8	0251	2.0	1009	.1	1503	.8	2030	0.0	
9	0230	2.2	1046	.1	1506	.5	9	0326	1.9	1032	0.0	1542	.9	2116	0.0	
10	0311	2.2	1121	-.1	1554	.6	10	0355	1.8	1056	0.0	1621	.9	2158	0.0	
11	0351	2.1	0427	2.0	1152	-.1	11	0426	1.6	1119	0.0	1700	1.0	2243	0.0	
12	0427	2.0	1221	1	1643	.7	12	0455	1.4	1144	0.0	1742	1.1	2332	0.0	
13	0502	1.9	1253	1	1732	.8	13	0521	1.3	1207	1.1	1827	1.1	1919	0.0	
14	0534	1.7	1337	-.3*	1827	.9	14	0024	4	0546	1.0	1229	1.1	2025	0.0	
15	0606	1.5	0634	1.3	1322	-.1	15	0138	6	0607	1	1301	1	2148	0.0	
16	0033	.5	0703	1.0	1423	-.2	16	0339	6	0618	.7	1332	.2	2148	0.0	
17	0151	.7	0724	.8	1456	-.2	17	1426	2	2300	1.4	---	---	---	---	
18	0354	.8	1542	.2	1732	-.2	18	1537	2	---	---	---	---	---	---	
19	0542	.2	2350	1.4	1631	1	19	2358	1.5*	0824	.3	1123	.4	1650	.2	
20	0037	1.6	0857	.4	1123	.5	20	0042	1.6	0835	.3	1225	.5	1752	0.0	
21	0117	1.7	0918	-.3	1232	.5	21	0121	1.7	0851	.2	1312	.6	1844	0.0	
22	0153	1.9	0937	-.3	1320	.5	22	0153	1.8	0912	.2	1355	.7	1929	0.0	
23	0227	2.0	0958	-.3	1405	.6	23	0229	1.8	0930	.1	1434	.9	2018	0.0	
24	0301	2.0	1023	-.2	1447	.6	24	0301	1.8	0953	0.0	1513	1.0	2107	0.0	
25	0332	2.0	1048	1	1529	.7	25	0333	1.7	1018	-.1	1559	1.1	2154	0.0	
26	0404	2.0	1114	-.1	1616	.8	26	0405	1.5	1046	-.1	1645	1.3	2248	0.0	
27	0436	1.9	1141	0.0	1703	.9	27	0439	1.4	1112	-.2	1733	1.4	2332	0.0	
28	0509	1.7	1211	0.0	1755	1.0	28	2349	.3*	0511	1.1	1144	.2	1829	1.4	
29	0544	1.4	1242	0.0	1858	1.1	29	---	---	---	---	---	---	---	---	
30	0041	.4	0615	1.2	1316	-.1	30	2007	1.3	---	---	---	---	---	---	
31	0041	.4	---	---	---	---	31	---	---	---	---	---	---	---	---	

\* -- TIDE OCCURS ON PREVIOUS DATE.

\* -- TIDE OCCURS ON PREVIOUS DATE.

## PORT ALLEN TIDES

MARCH 1990    159 DEG 35 MIN W - HANAPEPE BAY  
 21 DEG 54 MIN N.    159 DEG 35 MIN W - HANAPEPE BAY

PORT ALLEN TIDES  
 APRIL 1990  
 21 DEG 54 MIN N.    159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME	HGT AHST														
1	0108	.4	0546	.9	1217	.1	1937	1.5	1	.5	0500	.2	0833	.3	1328	.1
2	0254	.5	0628	.6	1302	.1	2054	1.5	2	.1	0606	.1	1045	.3	1502	.2
3	0529	.3	0727	.4	1358	0.0	2215	1.6	3	.0	0641	0.0	1158	.5	1641	.3
4	0705	.3	0954	.3	1517	.1	---	---	4	1.4*	2346	1.4*	0713	0.0	1247	.7
5	2326	1.7*	0740	.2	1147	.4	1643	.1	5	.0032	1.4	0737	.1	1326	.9	
6	0024	.1	0805	.1	1249	.5	1759	.1	6	.0110	1.4	0800	.1	1400	1.0	
7	0109	.1	0834	.1	1334	.7	1858	0.0	7	.0142	1.2	0818	.1	1431	1.2	
8	0151	.1	0856	0.0	1413	.9	1950	0.0	8	.0215	1.1	0837	.1	1500	1.4	
9	0223	.1	0917	0.0	1448	.9	2035	0.0	9	.0243	.9	0857	.1	1529	1.4	
10	0253	.1	0936	0.0	1520	1.1	2118	.1	10	.0311	.9	0916	.1	1602	1.4	
11	0322	1.4	0958	-.1	1555	1.2	2201	-.1	11	.0343	-.7	0940	-.1	1637	1.5	
12	0350	1.2	1016	0.0	1627	1.3	2245	-.2	12	.2341	2.*	0412	.6	1002	-.1	
13	0415	1.1	1036	0.0	1703	1.4	2331	-.3	13	.0038	-.3	0440	.5	1030	0.0	
14	0444	.9	1058	0.0	1745	1.4	---	---	14	.0146	.3	0512	.4	1056	0.0	
15	0028	.3	0509	0.8	1123	0.0	1830	1.4	15	.0318	-.3	0605	.3	1133	1.1	
16	0141	.4	0528	.6	1148	-.1	1929	1.3	16	.0448	.2	0745	.3	1226	.2	
17	0341	.4	0546	.5	1220	1.1	2041	1.3	17	.0526	.2	0956	.3	1352	.3	
18	1311	.2	2256	1.4	---	---	---	---	18	.0555	-.1	1109	.5	1538	.3	
19	0703	.3	0945	-.3	1441	.2	2301	1.4	19	.0620	0.0	1158	.7	1704	.3	
20	0711	.3	1123	-.4	1614	.2	---	---	20	.2334	1.3*	0642	-.1	1238	.9	
21	2351	1.4*	0730	-.2	1216	.5	1726	-.2	21	.0018	1.3	0707	-.2	1317	1.1	
22	0033	1.5	0751	1.1	1258	.7	1829	-.1	22	.0100	1.1	0732	-.3	1357	1.4	
23	0112	1.5	0809	0.0	1337	-.9	1924	0.0	23	.0142	1.0	0800	-.3	1442	1.6	
24	0146	1.5	0832	-.1	1416	1.1	2016	0.0	24	.0224	.9	0831	-.3	1525	1.8	
25	0221	1.4	0856	-.2	1455	1.3	2109	0.0	25	.0307	.7	0906	-.3	1610	1.9	
26	0300	1.3	0924	-.3	1540	1.4	2205	0.0	26	.0351	.5	0942	-.3	1659	2.0	
27	0335	1.1	0951	-.3	1627	1.6	2306	-.1	27	.0036	0.0	0440	.4	1020	-.3	
28	0414	.9	1021	-.3	1717	1.7	---	---	28	.0151	.1	0546	.3	1105	-.2	
29	0015	.2	0452	-.7	1056	-.3	1810	1.7	29	.0307	0.0	0711	.3	1200	0.0	
30	0137	-.3	0538	-.5	1135	-.2	1914	1.7	30	.0411	0.0	0901	.3	1310	1.2	
31	0317	-.3	0641	-.3	1221	-.1	2025	1.6	31	---	---	0205	1.5	2057	1.2	

\* -- TIDE OCCURS ON PREVIOUS DATE.

• -- TIDE OCCURS ON PREVIOUS DATE.

## PORT ALLEN TIDES

MAY 1990  
21 DEG 51 MIN N.  
159 DEG 35 MIN W - HANAPEPE BAY

PORT ALLEN TIDES

JUNE 1990  
21 DEG 54 MIN N.  
159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME	HGT AHST	TIME	HGT FT	TIME	HGT AHST	TIME	HGT FT	DATE	TIME	HGT AHST	TIME	HGT FT	TIME	HGT AHST	TIME	HGT FT
1	0503	-1	1044	.5	1453	.3	2158	1.4	1	0505	-1	1203	1.1	1752	.5	2233	.9
2	0541	-1	1142	.7	1632	.3	2254	1.3	2	0532	-1	1241	1.3	1913	.5	2319	.8
3	0611	-1	1228	.9	1758	.3	----	----	3	0558	-1	1315	1.4	2020	.4	----	----
4	2339	1.1*	0636	-1	1307	1.1	1905	.3	4	0008	.6	0623	-1	1347	1.5	2112	.3
5	0018	.9	0700	-2	1339	1.3	2002	.3	5	0053	.5	0652	-2	1423	1.7	2155	.3
6	0057	.9	0720	-2	1407	1.4	2050	.3	6	0135	.4	0721	-2	1455	1.8	2233	.2
7	0133	.7	0740	-2	1439	1.5	2136	.2	7	0217	.4	0756	-2	1527	1.8	2311	.2
8	0207	.6	0803	-2	1511	1.6	2222	.2	8	0255	.4	0828	-2	1603	1.8	----	----
9	0239	.5	0827	-2	1543	1.6	2310	.2	9	0250	.2*	0337	-3	0938	-2	1639	1.8
10	0314	.4	0855	-2	1618	1.7	----	----	10	0029	.1	0426	-3	0938	-1	1715	1.8
11	2356	.2*	0346	.4	0925	.2	1656	1.7	11	0108	.1	0519	.4	1020	0.0	1751	1.7
12	0045	.2	0429	.3	0954	-1	1736	1.6	12	0146	.1	0619	.4	1102	-1	1829	1.6
13	0140	.2	0520	.3	1029	0.0	1821	1.6	13	0218	0.0	0733	.5	1158	-3	1908	1.5
14	0236	.1	0629	.3	1111	-1	1907	1.5	14	0254	0.0	0847	.7	1311	-4	1949	1.4
15	0328	.1	0757	.3	1203	-2	1957	1.4	15	0326	-1	0957	.9	1454	.5	2034	1.2
16	0407	0.0	0931	.4	1326	.3	2048	1.4	16	0401	-1	1100	1.1	1649	.6	2130	.9
17	0438	0.0	1040	.6	1506	.4	2139	1.3	17	0436	.2	1152	1.4	1835	.5	2229	.8
18	0506	-1	1131	.9	1649	.4	2230	1.1	18	0513	-1	1243	1.7	1958	.3	----	----
19	0537	-2	1214	1.1	1815	.3	2321	.9	19	2335	.6*	0554	-3	1230	1.9	2104	.3
20	0606	-3	1300	1.4	1930	.3	----	----	20	0041	.5	0640	-3	1415	2.1	2156	1.1
21	0014	.9	0638	-3	1342	1.7	2039	.2	21	0139	.4	0726	-3	1503	2.2	2245	.1
22	0104	.7	0714	-4	1427	1.9	2141	.1	22	0242	.4	0814	-3	1547	2.2	2330	0.0
23	0155	.5	0752	-4	1512	2.0	2240	0.0	23	0341	.4	0903	-3	1632	2.1	----	----
24	0247	.4	0831	-4	1600	2.1	----	----	24	0012	0.0	0438	.4	0952	-2	1714	2.0
25	2339	0.0*	0343	.3	0915	-3	1647	2.1	25	0051	0.0	0538	.5	1044	0.0	1756	1.9
26	0037	0.0	0442	.3	1001	-3	1738	2.0	26	0130	0.0	0647	.6	1140	.2	1835	1.6
27	0133	-1	0551	.1	1050	-1	1828	1.9	27	0208	0.0	0759	.8	1242	.4	1914	1.4
28	0226	-1	0712	.3	1145	-1	1919	1.7	28	0244	0.0	0912	.9	1402	.6	1952	1.2
29	0315	-1	0842	.5	1258	.3	2006	1.4	29	0319	0.0	1021	1.0	1554	.7	2031	.9
30	0356	-1	1008	.7	1427	.4	2055	1.3	30	0352	0.0	1119	1.3	1800	.7	2117	.8
31	0433	-1	1110	.9	1613	.5	2147	1.0									

\* -- TIDE OCCURS ON PREVIOUS DATE.

\* -- TIDE OCCURS ON PREVIOUS DATE.

## PORT ALLEN TIDES

JULY 1990 21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY

## PORT ALLEN TIDES

AUGUST 1990  
21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME	HGT	TIME	HGT	TIME	HGT	DATE	TIME	HGT	TIME	HGT	DATE	TIME	HGT	
	AHST	FT	AHST	FT	AHST	FT		AHST	FT	AHST	FT		AHST	FT	
1	0426	0.0	1209	1.4	1940	.5	2212	.6	0505	.2	1301	1.7	2059	.4	
2	0502	0.0	1251	1.5	2042	.4	2321	.5	0025	.6	0558	.2	1340	1.9	
3	0538	0.0	1330	1.7	2124	.3	---	---	0112	.6	0646	.1	1413	2.0	
4	0027	.5	0617	0.0	1405	1.8	2153	.3	0155	.7	0728	0.0	1444	2.0	
5	0117	.4	0659	-.1	1437	1.9	2224	.3	0233	.8	0810	0.0	2204	.3	
6	0205	.5	0738	-.1	1511	2.0	2250	.3	0315	.9	0850	.1	2226	.3	
7	0247	.5	0816	-.1	1543	2.0	2318	.2	0357	.9	0935	-.1	2124	.3	
8	0327	.5	0854	-.1	1615	2.0	---	---	0440	1.0	1020	.3	2144	.3	
9	2347	2.	0413	6	0936	0.0	1647	1.9	2341	1.*	0529	1.2	2251	.2	
10	0015	1	0502	7	1015	1.1	1721	1.8	10	0013	1.0	0624	1.3	2315	.2
11	0044	1	0557	8	1104	1.3	1753	1.7	11	0041	1.1	0727	1.4	1616	1.9
12	0115	1	0657	9	1203	1.4	1825	1.4	12	0117	1.1	0842	1.5	1648	1.7
13	0147	0.0	0809	1.0	1319	1.6	1903	1.3	13	0207	1	1002	1.7	1720	1.5
14	0223	0.0	0918	1.2	1504	1.7	1945	1.0	14	0302	1	1111	1.9	1752	1.3
15	0258	0.0	1030	1.4	1718	1.7	2034	1.8	15	0411	1	1213	2.0	1827	1.1
16	0343	1	1132	1.7	1917	5	2153	.6	16	2355	6.*	0520	1	1906	.9
17	0434	1	1229	1.9	2027	4	---	---	17	0101	7	0626	1	2009	.7
18	2326	5.*	0529	-.2	1317	2.0	2112	3	18	0152	.8	0722	1	2218	1.5
19	0045	5	0625	-.2	1405	2.2	2149	2	19	0239	.9	0814	1	2230	.2
20	0146	5	0720	-.2	1449	2.2	2223	1	20	0318	1.0	0859	1	2256	.2
21	0242	6	0809	-.2	1530	2.2	2257	1	21	0400	1.2	0948	1.3	1338	1.9
22	0331	7	0901	-.1	1609	2.1	2328	1	22	0443	1.3	1035	3	1607	1.7
23	0423	8	0950	0.0	1645	2.0	---	---	23	0525	1.4	1125	4	1348	2.1
24	2358	1.*	0512	1.9	1036	1.2	1717	1.8	24	2344	1.2*	0611	1.4	1427	2.1
25	0028	1	0607	.9	1128	1.3	1753	1.5	25	0008	3	0703	1.4	1538	1.6
26	0059	1	0703	1.0	1228	1.5	1821	1.3	26	0037	3	0809	1.4	1639	1.5
27	012	1.2	0856	1.1	1345	.7	1853	1.1	27	0112	3	0921	1.4	1735	1.1
28	0200	2	0917	1.3	1538	.8	1918	.9	28	0205	3	1036	1.5	1757	.9
29	0235	1.2	1027	1.4	---	---	---	---	29	0322	4	1139	1.6	1815	.8
30	0318	1.2	1129	1.5	---	---	---	---	30	2327	6.*	0440	3	1224	1.7
31	0411	1.2	1219	1.6	2040	.4	2316	.5	31	0022	7	0537	3	1913	.4

- - - TIDE OCCURS ON PREVIOUS DATE.

\* - - TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES  
SEPTEMBER 1990  
21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME	HGT FT	TIME	HGT AHST FT											
1	0101	.8	0634	.3	1036	1.9	2046	.3	1	0121	1.2	0708	.3	1322	1.6
2	0141	.9	0720	.2	1405	1.9	2106	.3	2	0159	1.4	0800	.3	1354	1.5
3	0217	1.1	0805	.2	1437	1.9	2126	.2	3	0235	1.6	0852	.3	1430	1.4
4	0256	1.2	0848	.2	1509	1.8	2148	.2	4	0317	1.8	0945	.3	1508	1.3
5	0336	1.4	0937	.3	1541	1.6	2216	.1	5	0359	1.9	1042	.3	1544	1.1
6	0418	1.5	1028	.3	1613	1.4	2242	.1	6	0448	2.0	1148	.4	1622	.9
7	0506	1.6	1128	.4	1648	1.3	2311	.1	7	0540	2.0	1309	.4	1708	.8
8	0559	1.7	1239	.5	1723	1.0	---	---	8	0639	2.0	1444	.4	1810	.6
9	2346	1.1*	0701	1.8	1415	.6	1802	.9	9	2347	.2*	0748	2.0	1623	.4
10	0029	.2	0814	1.8	1632	.6	1905	.7	10	0048	.3	0901	1.9	1729	.3
11	0118	.3	0933	1.9	1814	.5	2114	.6	11	0221	.4	1011	1.8	1811	.3
12	0233	.3	1046	1.9	1900	.3	2313	.6	12	2331	.8*	0407	.5	1110	1.8
13	0406	.3	1147	2.0	1934	.3	---	---	13	0024	.9	0530	.5	1158	1.7
14	0022	.8	0526	.3	1237	2.0	2001	.3	14	0104	1.2	0639	.4	1240	1.5
15	0111	.9	0634	.3	1320	1.9	2026	.2	15	0141	1.4	0736	.4	1319	1.4
16	0150	1.1	0727	.3	1355	1.8	2047	.2	16	0139	1.5	0826	.4	1351	1.3
17	0225	1.3	0819	.3	1430	1.7	2109	.2	17	0244	1.7	0914	.4	1423	1.2
18	0300	1.4	0905	.3	1459	1.5	2131	.2	18	0315	1.8	1000	.4	1451	1.0
19	0336	1.5	0950	.3	1529	1.4	2152	.2	19	0348	1.8	1046	.4	1523	.9
20	0411	1.6	1037	.4	1559	1.2	2212	.2	20	0421	1.9	1135	.4	1555	.8
21	0450	1.6	1128	.5	1624	1.1	2234	.3	21	0459	1.8	1232	.5	1627	.7
22	0528	1.6	1228	.6	1656	.9	2259	.3	22	0541	1.8	1346	.5	1709	.6
23	0614	1.6	1338	.6	1721	.8	2324	.3	23	0633	1.7	1508	.4	1805	.5
24	0713	1.6	1538	.6	1754	.7	---	---	24	0729	1.7	1620	.4	1956	.5
25	0000	.4	0820	1.5	---	---	---	---	25	2359	.4*	0829	1.6	1706	.4
26	0049	.4	0935	1.6	1830	.5	2215	.6	26	0128	.5	0928	1.6	1738	.3
27	0228	.5	1041	1.6	1848	.4	---	---	27	0315	.6	1021	1.5	1756	.3
28	2327	.7*	0404	.5	1130	1.7	1906	.4	28	2348	.9*	0448	.6	1107	1.5
29	0013	.9	0517	.4	1212	1.7	1924	.3	29	0027	1.2	0601	.5	1151	1.4
30	0045	1.0	0615	.4	1248	1.7	1945	.3	30	0102	1.4	0704	.4	1233	1.4
									31	0139	1.6	0806	.4	1315	1.2

\* -- TIDE OCCURS ON PREVIOUS DATE.

\* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES  
NOVEMBER 1990  
21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME	HGT	AHST	TIME	HGT	AHST	TIME	HGT	AHST												
1	0218	1.9	0903	.3	1354	1.0	2003	-1	1	0249	2.2	1020	.3	1421	.6	2007	-.3				
2	0301	2.0	1002	.3	1439	.9	2036	-.2	2	0335	2.3	1112	.2	1513	.5	2052	-.3				
3	0346	2.2	1102	.3	1521	.8	2112	-.2	3	0423	2.3	1208	-.2	1611	.5	2137	-.2				
4	0435	2.2	1206	.3	1610	.6	2150	-.1	4	0509	2.3	1300	-.1	1717	.5	2226	0.0				
5	0526	2.2	1319	.3	1709	.5	2235	0.0	5	0559	2.1	1352	-.1	1831	.5	2320	.2				
6	0621	2.1	1435	.3	1830	.5	2325	-.2	6	0648	2.0	1441	-.1	1958	.7	---	---				
7	0720	2.0	1541	.3	2021	.5	---	---	7	0026	-.4	0736	1.7	1523	1	2130	.9				
8	0029	.3	0823	1.9	1629	-.2	2207	-.7	8	0154	-.6	0825	1.4	1602	1	2244	1.0				
9	0209	.5	0922	1.7	1708	-.2	2319	.9	9	0343	-.7	0917	1.2	1639	1	---	---				
10	0359	.6	1020	1.5	1742	-.1	---	---	10	2343	1.3*	0537	.8	1006	1.0	1709	.1				
11	0011	1.1	0535	.6	1109	1.4	1811	-.1	11	0025	1.4	0708	-.7	1102	.9	1740	0.0				
12	0053	1.4	0652	.6	1155	1.2	1835	-.1	12	0105	1.6	0817	.5	1152	.7	1809	0.0				
13	0126	1.5	0752	.5	1237	1.0	1858	0.0	13	0141	1.8	0910	-.4	1243	.6	1838	0.0				
14	0154	1.7	0844	.5	1312	.9	1920	0.0	14	0213	1.9	0948	-.3	1328	.6	1911	0.0				
15	0226	1.8	0930	.4	1347	.8	1944	0.0	15	0245	2.0	1024	-.3	1407	.6	1943	0.0				
16	0258	1.9	1015	.4	1423	.7	2010	0.0	16	0317	2.0	1059	-.3	1449	.5	2018	0.0				
17	0330	2.0	1101	.3	1455	.7	2037	0.0	17	0350	2.0	1133	-.3	1527	.5	2053	0.0				
18	0405	2.0	1536	.6	2106	-.1	18	0424	2.0	1206	-.3	1613	.5	2129	-.1						
19	0440	2.0	1232	.3	1612	.6	2138	-.1	19	0458	2.0	1241	-.3	1659	.6	2204	-.1				
20	0520	1.9	1324	.3	1705	.5	2211	-.2	20	0533	1.9	1317	-.2	1752	.6	2246	-.3				
21	0601	1.8	1413	.3	1809	.5	2251	-.3	21	0605	1.8	1348	-.2	1859	.7	---	---				
22	0644	1.7	1504	.3	1932	-.5	---	---	22	2338	-.3*	0641	1.6	1420	2	2011	.8				
23	0729	1.6	0713	.5	1543	-.3	2107	-.7	23	0038	-.5	0716	1.4	1454	-.1	2124	-.9				
24	0840	1.5	0815	1.5	1612	-.2	2223	.9	24	0210	-.7	0755	1.3	1529	1	2233	1.2				
25	0908	1.4	0908	1.4	1641	-.2	2316	1.0	25	0411	-.8	0847	1.0	1605	0	---	---				
26	0422	.7	0959	1.3	1709	-.1	---	---	26	2329	1.4*	0612	.7	0949	.9	1644	-.1				
27	2358	1.3*	0556	.7	1049	1.1	1740	0.0	27	0018	1.7	0741	-.5	1102	.7	1729	-.2				
28	0040	1.6	0713	.5	1144	-.9	1811	-.1	28	0109	2.0	0841	-.3	1211	.6	1817	-.3				
29	0122	1.9	0821	.4	1236	-.9	1847	-.2	29	0154	2.1	0936	-.3	1317	.5	1902	-.3				
30	0204	2.0	0920	.3	1328	-.7	1926	-.3	30	0240	2.3	1018	-.2	1417	.5	1955	-.3				
									31	0324	2.3	1100	-.1	1514	5	2043	-.3				

\* -- TIDE OCCURS ON PREVIOUS DATE.

• -- TIDE OCCURS ON PREVIOUS DATE.

## APPENDIX A

### HEIGHT OF THE TIDE AT ANY TIME

The height of the tide at times intermediate to the times of high and low water is needed on occasion, and may be computed by numerical methods. An example of the method, (adapted from table 3 of the data source), is presented here, using the predicted tides for a day at Point Mugu.

Problem: Given that the predicted times and heights of the tides are:

TIME	HEIGHT
0039	4.9
0814	0.2
1510	3.1
1933	2.4

What is the height of the tide at 0300?

#### Numerical Method

The duration of fall is 08h 14m - 00h 39m = 7h 35m

The time after high water is 03h 00m - 00h 39m = 2h 21m

The range of tide is 4.9 - 0.2 = 4.7 feet

Entering table A-1 at the duration of fall of 7h 40m, which is the nearest value to 7h 35m, the nearest value on the horizontal line to 2h 21m is 2h 18m after high water. Following down this column to its intersection with a range of 4.5 feet which is the nearest value to 4.7 feet, one obtains 0.9 which, being calculated from high water, must be subtracted from 4.9. The approximate height at 0300 is therefore 4.0 feet.

When the duration of rise or fall is greater than 10h 40m, enter the table with one-half the given duration and with one-half the time from nearest high or low water; but if the duration of rise or fall is less than 4h 00m, enter the table with double the given duration and time.

Table A-1 Height of the Tide at Any Time

Duration of rise or fall, see footnote	Time from the nearest high water or low water																	
	h m	h m.																
4.00	0.08	0.16	0.24	0.32	0.40	0.48	0.56	1.04	1.12	1.20	1.28	1.36	1.44	1.52	1.60			
4.20	0.09	0.17	0.26	0.35	0.43	0.52	1.01	1.09	1.18	1.27	1.35	1.44	1.53	2.01	2.10			
4.40	0.09	0.19	0.28	0.37	0.47	0.56	1.05	1.15	1.24	1.33	1.43	1.52	2.01	2.11	2.20			
5.00	0.10	0.20	0.30	0.40	0.50	1.00	1.10	1.20	1.30	1.40	1.50	2.00	2.10	2.20	2.30			
5.20	0.11	0.21	0.32	0.43	0.53	1.04	1.15	1.25	1.36	1.47	1.57	2.08	2.19	2.29	2.40			
5.40	0.11	0.23	0.34	0.45	0.57	1.08	1.19	1.31	1.42	1.53	2.05	2.16	2.27	2.39	2.50			
6.00	0.12	0.24	0.36	0.48	1.00	1.12	1.24	1.36	1.48	2.00	2.12	2.24	2.36	2.48	3.00			
6.20	0.13	0.25	0.38	0.51	1.03	1.16	1.29	1.41	1.54	2.07	2.19	2.32	2.45	2.57	3.10			
6.40	0.13	0.27	0.40	0.53	1.07	1.20	1.33	1.47	2.00	2.13	2.27	2.40	2.53	3.07	3.20			
7.00	0.14	0.28	0.42	0.56	1.10	1.24	1.38	1.52	2.06	2.20	2.34	2.48	3.02	3.16	3.30			
7.20	0.15	0.29	0.44	0.59	1.13	1.28	1.43	1.57	2.12	2.27	2.41	2.56	3.11	3.25	3.40			
7.40	0.15	0.31	0.46	1.01	1.17	1.32	1.47	2.03	2.18	2.33	2.49	3.04	3.19	3.35	3.50			
8.00	0.16	0.32	0.48	1.04	1.20	1.36	1.52	2.08	2.24	2.40	2.56	3.12	3.28	3.44	4.00			
8.20	0.17	0.33	0.50	1.07	1.23	1.40	1.57	2.13	2.30	2.47	3.03	3.20	3.37	3.53	4.10			
8.40	0.17	0.35	0.52	1.09	1.27	1.44	2.01	2.19	2.36	2.53	3.11	3.28	3.45	4.03	4.20			
9.00	0.18	0.36	0.54	1.12	1.30	1.48	2.06	2.24	2.42	3.00	3.18	3.36	3.54	4.12	4.30			
9.20	0.19	0.37	0.56	1.15	1.33	1.52	2.11	2.29	2.48	3.07	3.25	3.44	4.03	4.21	4.40			
9.40	0.19	0.39	0.58	1.17	1.37	1.56	2.15	2.35	2.54	3.13	3.33	3.52	4.11	4.31	4.50			
10.00	0.20	0.40	1.00	1.20	1.40	2.00	2.20	2.40	3.00	3.20	3.40	4.00	4.20	4.40	5.00			
10.20	0.21	0.41	1.02	1.23	1.43	2.04	2.25	2.45	3.06	3.27	3.47	4.08	4.29	4.49	5.10			
10.40	0.21	0.43	1.04	1.25	1.47	2.08	2.29	2.51	3.12	3.33	3.55	4.16	4.37	4.59	5.20			
Range of tide, see footnote	Correction to height																	
	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft	Ft
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
1.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6
1.5	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.8	0.9
2.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2
2.5	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.4
3.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.2	1.3	1.5	1.6	1.7	1.8
3.5	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.4	1.6	1.8	1.9	2.0	2.1
4.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.7	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.3	2.4
4.5	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.3	1.6	1.8	2.0	2.2	2.4	2.5	2.6
5.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.8	2.9	3.0
5.5	0.0	0.1	0.1	0.2	0.4	0.5	0.7	0.9	1.1	1.4	1.6	1.9	2.2	2.5	2.8	2.9	3.0	3.1
6.0	0.0	0.1	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.1	3.2	3.3
6.5	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.1	1.3	1.6	1.9	2.2	2.5	2.8	3.1	3.2	3.3	3.4
7.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.6	3.7	3.8
7.5	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.2	1.5	1.9	2.2	2.6	3.0	3.4	3.8	3.9	4.0	4.1
8.0	0.0	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.5	4.6
8.5	0.0	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.1	2.5	2.9	3.4	3.8	4.2	4.6	4.7	4.8
9.0	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.5	1.9	2.2	2.7	3.1	3.6	4.0	4.5	4.9	5.0	5.1
9.5	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.0	2.4	2.8	3.3	3.8	4.3	4.8	5.2	5.3	5.4
10.0	0.0	0.1	0.2	0.4	0.7	1.0	1.3	1.7	2.1	2.5	3.0	3.5	4.0	4.5	5.0	5.5	5.6	5.7
10.5	0.0	0.1	0.3	0.5	0.7	1.0	1.3	1.7	2.2	2.6	3.1	3.6	4.2	4.7	5.2			
11.0	0.0	0.1	0.3	0.5	0.7	1.1	1.4	1.8	2.3	2.8	3.3	3.8	4.4	4.9	5.5			
11.5	0.0	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	2.9	3.4	4.0	4.6	5.1	5.8			
12.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.0	3.6	4.1	4.8	5.4	6.0			
12.5	0.0	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.1	3.7	4.3	5.0	5.6	6.2			
13.0	0.0	0.1	0.3	0.6	0.9	1.2	1.7	2.2	2.7	3.2	3.9	4.5	5.1	5.8	6.5			
13.5	0.0	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.4	4.0	4.7	5.3	6.0	6.8			
14.0	0.0	0.2	0.3	0.6	0.9	1.3	1.8	2.3	2.9	3.5	4.2	4.8	5.5	6.3	7.0			
14.5	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.4	3.0	3.6	4.3	5.0	5.7	6.5	7.2			
15.0	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.5	3.1	3.8	4.4	5.2	5.9	6.7	7.5			
15.5	0.0	0.2	0.4	0.7	1.0	1.5	2.0	2.6	3.2	3.9	4.6	5.4	6.1	6.9	7.8			
16.0	0.0	0.2	0.4	0.7	1.1	1.5	2.1	2.6	3.3	4.0	4.7	5.5	6.3	7.2	8.0			
16.5	0.0	0.2	0.4	0.7	1.1	1.6	2.1	2.7	3.4	4.1	4.9	5.7	6.5	7.4	8.2			
17.0	0.0	0.2	0.4	0.7	1.1	1.6	2.2	2.8	3.5	4.2	5.0	5.9	6.7	7.6	8.5			
17.5	0.0	0.2	0.4	0.8	1.2	1.7	2.2	2.9	3.6	4.4	5.2	6.0	6.9	7.8	8.6			
18.0	0.0	0.2	0.4	0.8	1.2	1.7	2.3	3.0	3.7	4.4	5.3	6.2	7.1	8.1	9.0			
18.5	0.1	0.2	0.5	0.8	1.2	1.8	2.4	3.1	3.8	4.6	5.5	6.4	7.3	8.3	9.2			
19.0	0.1	0.2	0.5	0.8	1.3	1.8	2.4	3.1	3.9	4.6	5.6	6.6	7.5	8.5	9.5			
19.5	0.1	0.2	0.5	0.8	1.3	1.9	2.5	3.2	4.0	4.6	5.8	6.7	7.7	8.7	9.8			
20.0	0.1	0.2	0.5	0.9	1.3	1.9	2.6	3.3	4.1	5.0	5.9	6.9	7.9	8.9	9.0	10.0		

Obtain from the predictions the high water and low water, one of which is before and the other after the time for which the height is required. The difference between the times of occurrence of these tides is the duration of rise or fall, and the difference between their heights is the range of tide for the above table. Find the difference between the nearest high or low water and the time for which the height is required.

Enter the table with the duration of rise or fall, printed in heavy-faced type, which most nearly agrees with the actual value, and on that horizontal line find the time from the nearest high or low water which agrees most nearly with the corresponding actual difference. The correction sought is in the column directly below, on the line with the range of tide.

When the nearest tide is high water, subtract the correction.

When the nearest tide is low water, add the correction.

## APPENDIX B

### EQUINOXES, SOLSTICES, AND LUNAR PHASES 1990

The dates and times for Vernal and Autumnal Equinoxes and Summer and Winter Solstices during 1990 are listed in table B-1. The 1990 dates and times for phases of the moon are given in table B-2. Times are Pacific Standard Time, add 1 hour when Daylight Savings Time is in effect; add 2 hours for times in the Barking Sands area.

**Table B-1. Equinoxes and Solstices, 1990, Point Mugu Area**

Vernal Equinox	20 March	1319 PST	Beginning of Spring
Summer Solstice	21 June	0733 PST	Day and night equal length
Autumnal Equinox	22 September	2255 PST	Beginning of Summer
Winter Solstice	21 December	1907 PST	Greatest duration daylight
			Beginning of Autumn
			Day and night equal length
			Beginning of Winter
			Greatest duration darkness

**Table B-2. Lunar Phases, 1990, Point Mugu Area**

	JANUARY		FEBRUARY		MARCH		APRIL	
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
First Quarter	04	0240	02	1032	03	1805	02	0224
Full Moon	10	2057	09	1116	11	0258	09	1918
Last Quarter	18	1317	17	1048	19	0630	17	2302
New Moon	26	1120	25	0054	26	1148	24	2027
	MAY		JUNE		JULY		AUGUST	
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
First Quarter	01	1218	--	----	--	----	--	----
Full Moon	09	1131	08	0301	07	1723	06	0619
Last Quarter	17	1145	15	2048	15	0304	13	0754
New Moon	24	0347	22	1055	21	1854	20	0439
First Quarter	31	0011	29	1407	29	0601	27	2334
	SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME
Full Moon	04	1746	04	0402	02	1348	01	2350
Last Quarter	11	1253	10	1931	09	0502	08	1804
New Moon	18	1646	18	0737	17	0105	16	2022
First Quarter	26	1806	26	1226	25	0511	24	1916
Full Moon	--	---	--	----	--	----	31	1035

Because the earth's period of revolution about the sun (365.24+ days) is not evenly divisible by the moon's period of revolution about the earth (27.32+ days), the dates and times of lunar phases, moonrise and moonset, and tidal data must be recomputed for each year. The following information, however, is based on geometrical relationships and holds true for all times:

1. The New Moon rises at sunrise, crosses the meridian at noon, and sets at sunset.
2. The First Quarter Moon rises at noon, crosses the meridian at sunset, and sets at midnight.
3. The Full Moon rises at sunset, crosses the meridian at midnight, and sets at sunrise.
4. The Last Quarter Moon rises at midnight, crosses the meridian at sunrise and sets at noon.

**APPENDIX C**  
**SUNRISE AND SUNSET TABLES**

**Sunrise, Sunset, and Duration of Twilight for Point Mugu, CA**  
 34°07' N, 119°07' W

Note: All times are Pacific Standard Time (120th meridian); add 1 hour when Daylight Savings Time is in effect.

Date	January		February		March		April		May		June		Date
	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	Sunrise	Sunset	
1	0702	1658	0654	1727	0626	1753	0544	1817	0507	1840	0446	1903	1
2	0703	1659	0653	1728	0624	1753	0543	1818	0506	1841	0446	1903	2
3	0703	1700	0652	1729	0623	1754	0541	1819	0505	1842	0445	1904	3
4	0703	1700	0652	1730	0622	1755	0540	1819	0504	1843	0445	1904	4
5	0703	1701	0651	1731	0621	1756	0539	1820	0503	1843	0445	1905	5
6	0703	1702	0650	1732	0619	1757	0537	1821	0502	1844	0445	1905	6
7	0703	1703	0649	1733	0618	1758	0536	1822	0502	1845	0445	1906	7
8	0703	1704	0648	1734	0617	1758	0535	1822	0501	1846	0444	1906	8
9	0703	1705	0647	1734	0615	1759	0533	1823	0500	1846	0444	1907	9
10	0703	1705	0647	1735	0614	1800	0532	1824	0459	1847	0444	1907	10
11	0703	1706	0646	1736	0613	1801	0531	1825	0458	1848	0444	1908	11
12	0703	1707	0645	1737	0611	1802	0530	1825	0457	1849	0444	1908	12
13	0703	1708	0644	1738	0610	1802	0528	1826	0456	1849	0444	1909	13
14	0702	1709	0643	1739	0609	1803	0527	1827	0456	1850	0444	1909	14
15	0702	1710	0642	1740	0607	1804	0526	1828	0455	1851	0444	1909	15
16	0702	1711	0641	1741	0606	1805	0525	1829	0454	1852	0444	1910	16
17	0702	1712	0640	1742	0605	1806	0523	1829	0453	1852	0444	1910	17
18	0701	1713	0638	1743	0603	1806	0522	1830	0453	1853	0445	1910	18
19	0701	1714	0637	1744	0602	1807	0521	1831	0452	1854	0445	1911	19
20	0701	1715	0636	1745	0601	1808	0520	1832	0451	1855	0445	1911	20
21	0700	1716	0635	1746	0559	1809	0518	1832	0451	1855	0445	1911	21
22	0700	1717	0634	1747	0558	1809	0517	1833	0450	1856	0445	1911	22
23	0659	1718	0633	1747	0556	1810	0516	1834	0450	1857	0446	1911	23
24	0659	1719	0632	1748	0555	1811	0515	1835	0449	1857	0446	1912	24
25	0658	1720	0630	1749	0554	1812	0514	1835	0449	1858	0446	1912	25
26	0658	1721	0629	1750	0552	1813	0513	1836	0448	1859	0446	1912	26
27	0657	1722	0628	1751	0551	1813	0512	1837	0448	1900	0447	1912	27
28	0657	1723	0627	1752	0550	1814	0511	1838	0447	1900	0447	1912	28
29	0656	1724	0626	1752	0548	1815	0509	1839	0447	1901	0447	1912	29
30	0655	1725	0625	1752	0547	1816	0508	1839	0447	1901	0448	1912	30
31	0655	1726	0624	1752	0546	1816	0508	1840	0446	1902	0448	1912	31
	Average twilight Civil: 27 min. Nautical: 38 min.	Average twilight Civil: 26 min. Nautical: 39 min.	Average twilight Civil: 25 min. Nautical: 34 min.	Average twilight Civil: 26 min. Nautical: 37 min.	Average twilight Civil: 28 min. Nautical: 41 min.	Average twilight Civil: 29 min. Nautical: 43 min.							
Date	July Sunrise	Sunset	August Sunrise	Sunset	September Sunrise	Sunset	October Sunrise	Sunset	November Sunrise	Sunset	December Sunrise	Sunset	Date
1	0448	1912	0507	1858	0530	1823	0551	1741	0616	1704	0644	1647	1
2	0449	1912	0508	1857	0530	1821	0551	1740	0617	1703	0645	1647	2
3	0449	1912	0509	1856	0531	1820	0552	1738	0618	1702	0646	1647	3
4	0450	1912	0510	1855	0532	1819	0553	1737	0619	1701	0646	1647	4
5	0450	1912	0510	1854	0532	1817	0554	1736	0620	1700	0647	1647	5
6	0451	1911	0511	1853	0533	1816	0554	1734	0621	1659	0648	1647	6
7	0451	1911	0512	1852	0534	1815	0555	1733	0621	1658	0649	1647	7
8	0452	1911	0512	1851	0535	1813	0556	1732	0622	1658	0650	1647	8
9	0452	1911	0513	1850	0535	1812	0557	1730	0623	1657	0650	1647	9
10	0453	1910	0514	1849	0536	1810	0557	1729	0624	1656	0651	1647	10
11	0453	1910	0515	1848	0537	1809	0558	1728	0625	1655	0652	1647	11
12	0454	1910	0515	1847	0537	1808	0559	1726	0626	1655	0653	1648	12
13	0454	1909	0516	1846	0538	1805	0600	1725	0627	1654	0653	1648	13
14	0455	1909	0517	1845	0539	1805	0601	1724	0628	1653	0654	1648	14
15	0456	1909	0518	1844	0539	1803	0601	1723	0629	1653	0655	1648	15
16	0456	1908	0518	1843	0540	1802	0602	1721	0630	1652	0655	1649	16
17	0457	1908	0519	1841	0541	1801	0603	1720	0631	1652	0656	1649	17
18	0458	1907	0520	1840	0541	1759	0604	1719	0632	1651	0657	1650	18
19	0458	1907	0520	1839	0542	1758	0605	1718	0633	1651	0657	1650	19
20	0459	1906	0521	1838	0543	1756	0606	1717	0634	1650	0658	1650	20
21	0500	1906	0522	1837	0544	1755	0606	1715	0635	1650	0658	1651	21
22	0500	1905	0523	1835	0544	1754	0607	1714	0636	1649	0659	1651	22
23	0501	1904	0523	1834	0545	1752	0608	1713	0637	1649	0659	1652	23
24	0502	1904	0524	1833	0546	1751	0609	1712	0637	1649	0700	1653	24
25	0502	1903	0525	1832	0546	1749	0610	1711	0638	1648	0700	1653	25
26	0503	1902	0525	1830	0547	1748	0611	1710	0639	1648	0700	1654	26
27	0504	1902	0526	1829	0548	1747	0611	1709	0640	1648	0701	1654	27
28	0504	1901	0527	1828	0549	1745	0612	1708	0641	1647	0701	1653	28
29	0505	1900	0528	1827	0549	1744	0613	1707	0642	1647	0702	1656	29
30	0506	1859	0528	1825	0550	1742	0614	1706	0643	1647	0702	1656	30
31	0507	1858	0529	1824			0615	1705			0702	1657	31
	Average twilight Civil: 29 min. Nautical: 43 min.	Average twilight Civil: 26 min. Nautical: 38 min.	Average twilight Civil: 25 min. Nautical: 33 min.	Average twilight Civil: 25 min. Nautical: 34 min.	Average twilight Civil: 27 min. Nautical: 37 min.	Average twilight Civil: 28 min. Nautical: 39 min.							

Revised for use in future years. These data valid through 2020.

Sunrise, Sunset, and Duration of Twilight for Barking Sands, Kauai, HI  
22°02' N, 159°47' W

Note: All times are Alaska-Hawaii Standard Time (150th Meridian).

Date	January		February		March		April		May		June		Date
	Sunrise	Sunset											
1	0718	1807	0718	1826	0700	1843	0632	1854	0607	1905	0555	1919	1
2	0719	1808	0717	/	0659	1843	0631	1855	0607	1906	0555	1919	2
3	0719	1809	0717	1830	0659	1844	0630	1855	0606	1906	0555	1920	3
4	0719	1809	0716	1830	0658	1844	0629	1855	0606	1906	0555	1920	4
5	0719	1810	0716	1831	0657	1845	0628	1856	0605	1907	0555	1920	5
6	0720	1811	0715	1831	0656	1845	0627	1856	0604	1907	0555	1921	6
7	0720	1811	0715	1832	0655	1846	0627	1856	0604	1908	0555	1921	7
8	0720	1812	0714	1833	0654	1846	0626	1857	0603	1908	0555	1921	8
9	0720	1813	0714	1833	0653	1846	0625	1857	0603	1909	0555	1922	9
10	0720	1813	0713	1834	0653	1847	0624	1857	0602	1909	0555	1922	10
11	0720	1814	0713	1834	0652	1847	0623	1858	0602	1909	0555	1922	11
12	0721	1815	0712	1835	0651	1847	0622	1858	0601	1910	0555	1923	12
13	0721	1815	0712	1835	0650	1848	0621	1858	0601	1910	0555	1923	13
14	0721	1816	0711	1836	0649	1848	0620	1859	0600	1911	0555	1923	14
15	0721	1817	0710	1836	0648	1848	0620	1859	0600	1911	0555	1924	15
16	0721	1818	0710	1837	0647	1849	0619	1859	0559	1912	0555	1924	16
17	0721	1818	0709	1837	0646	1849	0618	1900	0559	1912	0556	1924	17
18	0721	1819	0709	1838	0645	1850	0617	1900	0559	1913	0556	1925	18
19	0721	1820	0708	1838	0644	1850	0616	1900	0558	1913	0556	1925	19
20	0720	1820	0707	1839	0643	1850	0615	1901	0558	1914	0556	1925	20
21	0720	1821	0706	1839	0642	1851	0615	1901	0558	1914	0556	1925	21
22	0720	1822	0706	1840	0641	1851	0614	1902	0557	1914	0557	1925	22
23	0720	1822	0705	1840	0641	1851	0613	1902	0557	1915	0557	1926	23
24	0720	1823	0704	1841	0640	1852	0612	1902	0557	1915	0557	1926	24
25	0720	1824	0703	1841	0639	1852	0612	1903	0557	1916	0557	1926	25
26	0719	1824	0703	1842	0638	1852	0611	1903	0556	1916	0558	1926	26
27	0719	1825	0702	1842	0637	1853	0610	1904	0556	1917	0558	1926	27
28	0719	1826	0701	1843	0636	1853	0609	1904	0556	1917	0558	1926	28
29	0719	1826	0701	1843	0635	1853	0609	1904	0556	1917	0558	1926	29
30	0718	1827			0634	1854	0608	1905	0555	1918	0559	1927	30
31	0718	1828			0633	1854			0555	1918			31
	Average twilight Civil: 24 min. Nautical: 31 min.		Average twilight Civil: 23 min. Nautical: 30 min.		Average twilight Civil: 22 min. Nautical: 28 min.		Average twilight Civil: 23 min. Nautical: 30 min.		Average twilight Civil: 24 min. Nautical: 33 min.		Average twilight Civil: 23 min. Nautical: 33 min.		
Date	July		August		September		October		November		December		Date
	Sunrise	Sunset											
1	0559	1927	0611	1919	0622	1856	0630	1827	0643	1802	0702	1755	1
2	0559	1927	0612	1919	0622	1855	0631	1826	0643	1802	0702	1755	2
3	0600	1927	0612	1918	0623	1854	0631	1825	0644	1801	0703	1755	3
4	0600	1927	0612	1918	0623	1853	0631	1824	0645	1801	0703	1755	4
5	0600	1927	0613	1917	0623	1852	0632	1823	0645	1800	0704	1755	5
6	0601	1927	0613	1916	0623	1851	0632	1822	0646	1800	0705	1756	6
7	0601	1927	0614	1916	0624	1850	0632	1821	0646	1759	0705	1756	7
8	0602	1927	0614	1915	0624	1849	0633	1820	0647	1759	0706	1756	8
9	0602	1926	0614	1914	0624	1848	0633	1819	0647	1758	0707	1756	9
10	0602	1926	0615	1914	0625	1847	0633	1819	0648	1758	0707	1757	10
11	0603	1926	0615	1913	0625	1846	0634	1818	0649	1758	0708	1757	11
12	0603	1926	0616	1912	0625	1845	0634	1817	0649	1757	0709	1757	12
13	0603	1926	0616	1912	0625	1844	0634	1816	0650	1757	0709	1758	13
14	0604	1926	0616	1911	0626	1843	0635	1815	0650	1757	0710	1758	14
15	0604	1926	0617	1910	0626	1842	0635	1814	0651	1756	0710	1758	15
16	0605	1925	0617	1909	0626	1841	0636	1813	0652	1756	0711	1759	16
17	0605	1925	0617	1909	0626	1840	0636	1813	0652	1756	0712	1759	17
18	0606	1925	0618	1908	0627	1839	0636	1812	0653	1756	0712	1800	18
19	0606	1925	0618	1907	0627	1838	0637	1811	0654	1755	0713	1800	19
20	0606	1924	0618	1906	0627	1837	0637	1810	0654	1755	0713	1800	20
21	0607	1924	0619	1905	0628	1836	0638	1810	0655	1755	0714	1801	21
22	0607	1924	0619	1905	0628	1836	0638	1809	0654	1755	0714	1801	22
23	0608	1923	0619	1904	0628	1835	0639	1808	0654	1755	0715	1802	23
24	0608	1923	0620	1903	0628	1834	0639	1807	0657	1755	0715	1803	24
25	0608	1922	0620	1902	0629	1833	0639	1807	0658	1755	0716	1803	25
26	0609	1922	0620	1901	0629	1832	0640	1806	0658	1755	0716	1804	26
27	0609	1922	0621	1900	0629	1831	0640	1805	0659	1755	0716	1804	27
28	0610	1921	0621	1859	0630	1830	0641	1804	0700	1755	0717	1805	28
29	0610	1921	0621	1859	0630	1829	0641	1804	0700	1755	0717	1805	29
30	0610	1920	0621	1858	0630	1828	0642	1803	0701	1755	0718	1806	30
31	0611	1920	0622	1857			0642	1803			0718	1807	31
	Average twilight Civil: 23 min. Nautical: 34 min.		Average twilight Civil: 23 min. Nautical: 30 min.		Average twilight Civil: 22 min. Nautical: 28 min.		Average twilight Civil: 23 min. Nautical: 49 min.		Average twilight Civil: 24 min. Nautical: 31 min.		Average twilight Civil: 24 min. Nautical: 32 min.		

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Defense Technical Information Center	12	Attn: CAPT Palmer
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Staff Oceanographer (N36)		Hawaiian Area, Barking Sands
FPO San Francisco, CA 9660		Kekaha, Kauai, HI 96752-0128
Commanding Officer Naval Civil Engineering Lab		National Weather Service
Attn: Code L08A (Library)	1	Weather Service Forecast Office
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Code L63 (E. Durlak)	1	11000 Wilshire Boulevard
(D. Pendleton	1	Los Angeles, CA 90024-3613
Port Hueneme, CA 93043-5003		USDA Soil Conservation Service
Commanding Officer Naval Oceanography Command City	1	P.O. Box 260
Naval Air Station, North Is		3380 Somis Rd.
San Diego, CA 92135-5130		Somis, CA 93106-0260
Noncommissioned Officer in Je	1	Ventura College
Surf and Weather Office		Biology Department
Marine Corps Base		4667 Telegraph Road
Camp Pendleton, CA 92055-		Attn: Mr. Thor Willsrud
Commanding Officer Naval Western Oceanographer	1	Ventura, CA 93003-3899
Box 113		County of Ventura
Pearl Harbor, HI 96860-5		800 S. Victoria Avenue
Commanding Officer Debachment 30	1	Attn: Flood Control District
6th Weather Wing		Public Works Agency
Vandenberg AFB, CA 9343		Sheriff's Department/
		Emergency Services
		Ventura, CA 93003-5340
		Camarillo Daily News
		1000 Avenida Acaso
		Camarillo, CA 93010-8712
		Dr. Victor Bobrow, OD
		461 W. Fifth St.
		Oxnard, CA 93030-7049

**INTERNAL**

Commanding Officer  
Naval Air Station  
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Air Operations Officer  
Code 6100 (CDR Manley)

Administrative Division  
Code 6110

Air Traffic Control Facility  
Code 6130 (LCPO)

Engineering Division  
Code 6230-2 (Dow)  
Code 6232 (Jensen)

Maintenance Control Division  
Code 6243 (Qualls)

Island Division  
Code 6280 (Haynes)

OIC, San Nicolas Island  
Code 6400 (LCDR Buskey)

Security Department  
Code 6500 (CDR Crenshaw)  
Code 6520 (Bonner)  
Code 6551 (Crisis Response Force)

Aircraft Maintenance Dept  
Code 6700 (CDR Mannel)

Surface Craft Division  
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Vice Commander, PACMISTESTCEN Code 01 (CAPT Vernalis)	1
Executive Director Code 02 (Dr. Warnagieris)	1
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HARPOON Program Office Code 1091 (CDR Hargrave)	2
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